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Volume 10 - Number 4

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Volume 10 October-December Number 4

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REPORT OF THE TRIENNIAL MEETING OF THE WORLD'S POULTRY ASSOCIATION

The Triennial meeting of the World's Poultry Science Association was held in Edinburgh on August 20, 1954 on the occasion of the 10th World's Poultry Congress when there was an attendance of over 130 members from 27 countries.

In opening the meeting the President extended a very warm welcome to those present and expressed the hope that the meeting would be both illuminating and useful.

The Secretary submitted the Report of the meeting of the Council held on August 15th at which there was an attendance of 34 members representing 17 countries. (World's Poultry Science Journal, July-Sept., 1954, p. 215).

Mr. J. G. Tukker (The Netherlands) submitted the following report on behalf of the Egg Grades Standards Committee of which he is Chairman:

"Three years ago when I was appointed Chairman of your Egg Grades Standards Committee, the question of uniform specifications for eggs for Europe was being discussed at Geneva by a Committee of the Economic Commission for Europe (E.C.E.) That Committee has, so far, held 5 meetings: 3 at Geneva, 1 in London and 1 at The Hague. Up to the present it has not been possible for the E.C.E. Committee to arrive at full agreement amongst themselves but the diversity of views is so small that it is hoped to reach such agreement at an early date. Another meeting is being held at the end of September. Copies of their scheme have been sent to the Secretary of the Association and to all members of the Council. In my opinion, it is desirable that we should cooperate as closely as we can with the E.C.E. Committee and there should be no difficulty in coming to such an arrangement.

I do not intend to give details of the draft now. I only should like to say that the general provisions, to which shell-eggs and their packaging should conform, are set out under 7 headings:

1. Denomination of eggs,
2. Definitions of the denomination,
3. Quality of individual eggs,
4. Classification by weight,
5. Marking of eggs,
5. Packaging of eggs,
7. Marking of packages.

The E.C.E. Committee's scheme was discussed at a meeting of our Committee on 18th August when the views of representatives of other countries were presented. No final conclusions were arrived at. If agreement is reached at the meeting of the E.C.E. Committee next month, their findings may afford a foundation on which our Committee can work and that, at the next meeting of Congress, it will be possible to recommend grades and standards for eggs and containers which will be suitable for general acceptance." (*N.B.* It is understood that the E.C.E. Committee arrived at complete agreement on their Scheme at their meeting in September.)

In submitting the Report of the Egg Laying Tests Committee, Professor R. George Jaap who was deputising for Professor C. S. Platt (Chairman), briefly described the report prepared by him. He reported that a meeting of the Committee had been held on August 18th. They had arrived at the following conclusions and considered that the information would be useful in assessing the value of and trends in Laying Tests but hesitated to suggest added work to what must be a considerable task undertaken by Professor Platt:

1. That information on changes in and trends of laying tests should continue to be collected.
2. That body weight at the beginning and end of test would be desirable.
3. Type of test should be classified; i.e. Battery, confinement, single pen or trapnest, and whether private or government controlled.
4. Number of birds in a pen.
5. Age at which the entries came to the test location; i.e., day-old, hatching eggs or laying pullets.
6. Length of test.
7. Method of selecting entry.

The following recommendations were then submitted to the Council:

(a) The thanks of the Association are due to Professor Platt for the considerable work spent in collecting and collating the data contained in the accompanying report.

(b) It is desirable, where possible, that Laying Trials of both the Progeny Test and of the Random Sample Types be developed throughout the various countries of the world.

In speaking to these resolutions Mr. G. Hibbert, (South Africa) said:

"There is one point very evident from the report of Professor Platt and that is that it is going to be impossible to

secure all the information that is necessary for one of the original intentions of the Egg Laying Tests Committee, namely to get unification of all statistical data so that it would be an attempt to secure that laying tests throughout the world were on the same basis. The duties of the Egg Laying Tests Committee have therefore had to be turned in another direction, to secure as much data as possible to be of use on the lines indicated both at the last Congress and at the present one, and that is to use the egg laying tests for the development of the poultry industry in the best direction. The Laying Tests Committee, however, do feel that the task put upon one person in an honorary capacity is asking too much and it is therefore rather reluctant to try and press forward with much that would be of benefit and has made certain recommendations in that respect. We do feel, however, and I would like to move, that this Congress adopts the resolutions put forward by the Committee in order to keep the work alive and to attempt to give us some information which we think will be of benefit to the poultry industry throughout the world."

The resolutions were received and approved with acclamation.

Dr. H. Engler then submitted a report on the work of F.A.O. (the Food and Agriculture Organization of the United Nations) and was thanked for his interesting address.

The following resolution was submtited by Mr. G. Hibbert (South Africa):

"That this Triennial Meeting of the Association requests the Council to recommend amended proceedings at future Congresses in order to permit of adequate discussions on the papers submitted and so fulfill the essential function of Congresses. It recommends that the following alternatives be considered:

(1) That morning and afternoon sessions be arranged and discussions allowed for ¾ to 1 hour after each paper, the presentation of papers being limited as at present.
Excursions could be arranged for members desirous of such relaxation.

(2) That instead of 3 or more principal papers, at least 4 afternoon sessions be devoted, on different days, to an open forum or symposium, with discussions by 4 or more of the leading authorities (with opposing views if possible) on each of the following subjects, Diseases, Genetics, Nutrition and either Husbandry or

Marketing. Each session to have 30 minutes devoted to selected important factors of the particular subject selected.

(3) As an alternative to No. 2, the Council might consider 2 symposia or 2 meetings of a quiz nature, questions having to be selected and edited beforehand to ensure discussion and explanation of topical and important problems."

After lengthy discussion it was agreed by a majority of 34 to 27 to submit the resolution to the Council for their consideration.

The following resolutions were then unanimously adopted for presentation at the Final Plenary Session on behalf of all the members attending the Tenth World's Poultry Congress:

"THE TENTH WORLD'S POULTRY CONGRESS expresses its deep and respectful appreciation of the great honor conferred upon it by the gracious patronage of Her Majesty the Queen and of His Royal Highness the Duke of Edinburgh, and by the presence and special interest in its proceedings of Her Royal Highness Princess Alice, Countess of Athlone, and the Earl of Athlone."

"THE CONGRESS gratefully acknowledges the courtesy of Her Majesty's Government in inviting it to Scotland, and of the Rt. Hon. James Stuart, Secretary of State for Scotland, for consenting to act as its Honorary President. The members greatly appreciate the personal participation of the Earl of Home, Minister of State for Scotland, and of Mr. W. McNair Snadden, J.P., M.P., Joint Parliamentary Under Secretary of State."

"THE CONGRESS is profoundly grateful to the Lord Provost, Magistrates and Council of the City of Edinburgh for the help which they have at all times given in the preparation and carrying out of the arrangements in Edinburgh, and for their personal kindness and hospitality which added so much to the enjoyment of the visitors."

"THE CONGRESS expresses its gratitude to the University of Edinburgh for their unfailing interest and the unstinted assistance and facilities afforded, in accommodation and in numerous other ways, without which it would hardly have been possible to hold the Congress in Edinburgh.

The members are grateful, too, to the Director and staff of the Royal Scottish Museum for their cordial co-operation in connection with the Education and Research Exhibition."

"THE CONGRESS cordially thanks its president, Sir

Patrick Laird, and the chairmen and vice-chairmen of sessions, for their devoted work throughout the period. Their task was rendered at once more onerous and more rewarding by reason of the great interest evinced by members and the large numbers who attended the sessions."

"THE CONGRESS records its deep appreciation of the work of the Congress Organization which, under the chairmanship of Mr. A. Glen, and through the enthusiastic activities of its various committees and the Secretariat, worked out over a long period the arrangements which resulted in the smooth and successful running of the Congress."

"THE CONGRESS desires especially to stress the good work done by the Ladies' Committee, under the chairmanship of the Lady Elphinstone, and by the many ladies other than Committee members whose help was invoked in innumerable ways. These included the provision of much private hospitality, which will remain a most pleasant memory in the minds of the visitors who participated."

"THE CONGRESS records with deep appreciation the great help given by various organizations and individual persons too numerous to specify. This has included substantial donations of money, the devotion of time and services free of all charge, and hospitality on a most generous scale. These services have done much to make the Congress a success."

A very special debt of gratitude is due to the General Officer Commanding-in-Chief, Scottish Command, for his kindness in inviting the members to the Dress Rehearsal of the Festival Military Tattoo."

The President, in declaring the meeting closed, thanked Members for their loyal co-operation and help during his term of office. He referred to the help he had received from the Treasurer and Secretary. He congratulated his successor on his appointment and wished him a happy and successful term of office. He appealed strongly to members to do all in their power to secure a substantial increase in membership. Only by such an increase could the useful services of their Association be extended and enlarged.

Ian Macdougall (Secretary)

REPORT OF THE EGG LAYING TEST COMMITTEE OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

prepared by

Prof. S. C. Platt

Rutgers University, New Brunswick, New Jersey, U.S.A.

The first report of this committee, setting forth the basic rules of the egg laying tests throughout the world, appeared in the World's Poultry Science Journal, Vol. 6, No. 4, Oct.-Dec., 1950, pp. 292-297.

At a meeting of the committee held in Paris on August 7, 1951, at the time of the 9th World's Poultry Congress, the chairman was asked to gather additional information from the tests, looking forward to the possibility of establishing some uniformity of objectives and rules. This was done, and a mimeographed summary was sent to all members of the committee on November 1952.

From this study, there seemed to be a possibility of unifying rules for laying tests along three distinct lines:

(1) Sire testing, requiring the pullets to be daughters of one sire and not less than three dams;

(2) Random sample testing of commercially bred stock by the use of 25 to 50 pullet chicks reared on the home farm or at a central testing station;

(3) Standard testing of any stock a breeder cared to enter, without any measure of control.

In principle, the greatest interest appeared to be in the random sample type of test, with chicks identified at time of hatching.

Reporting laying tests records on an international basis was also considered and the tests were asked to submit a summary of their records for the 1952-53 test year; the following items were requested for each breed:

Name of breed
Number of birds entered
Number of eggs for official record
Eggs per bird entered
Number of birds that lived
Number of eggs laid by living birds
Eggs per bird that lived
Percent mortality
Body weight at end of test
Average weight of eggs
Highest individual bird record

TABLE I

*Laying tests throughout the world reporting records for the 1952-53 test year**

Name and address of test	*Duration of test*	*Closing date*
Hawkesbury Agricultural College Egg Laying Competition, Richmond, N.S.W., Australia	350 days	Mar. 16, 1953
Burnley Egg Laying Competition, Burnley, Victoria, Australia	48 weeks	Mar. 2, 1953
Concours National DePonte de Belgique, Kattestraat, 50, Roeselare, Belgium	48 weeks	Sept. 1, 1953
Sveriges fjäderfäavelsförening, Vasagatan 5, Stockholm, Sweden (1)	12 months	Aug. 31, 1953
Malmöhus läns Fjäderfäavelsförenings värpkontroll, Svalöf, Sweden (2)	11 months	Aug. 31, 1953
Poultry Progeny Tests, Favrholm, Hillerod, Denmark	12 months	Sept. 30, 1953
National Egg Laying Test, Milford, Surrey, England	48 weeks	Sept. 13, 1953
B.O.C.M. Dual Cross Bred Poultry Trials, Northern Testing Station, Selby, Yorks, England (1)	48 weeks	July 18, 1953
B.O.C.M. Cafeteria Laying Trials, Northern Testing Station, Selby, Yorks, England (2)	12 months	June 27, 1953
National Egg Laying Test, Munster Institute, Cork, Ireland	46 weeks	Aug. 18, 1953
Stormont Laying Test, Poultry Division, Stormont, Belfast, North Ireland	48 weeks	Sept. 1, 1953
Southern Rhodesia Official Annual Egg Laying Test, Dept. of Research & Specialist Services, Causeway, Southern Rhodesia	48 weeks	Jan. 30, 1953
Johannesburg Egg Laying Test, Boschkop Farm, Johannesburg, South Africa (1)	48 weeks	Mar. 16, 1953

Johannesburg Egg Laying Test, Boschkop Farm, Johannesburg, South Africa (2)	48 weeks	Mar. 16, 1953
Parafield Official Egg Laying Competition, Adelaide, South Australia	365 days	Mar. 31, 1953
Concurso Nacional de Puesta, Santiago de las Vegas, Habana, Cuba	50 weeks	Sept. 15, 1953
Yorkshire Federation International Laying Test, Otley, Yorks, England	48 weeks	Sept. 7, 1953
Arizona Egg Laying Test, University of Arizona, Tucson, Arizona, U.S.A.	50 weeks	Sept. 15, 1953
Thirteenth California Official Egg Laying Test, Rt. 3, Box 1145, Modesto, California, U.S.A.	50 weeks	Sept. 15, 1953
Storrs Egg Laying Test, University of Connecticut, Storrs, Conn., U.S.A.	50 weeks	Sept. 15, 1953
Florida National Egg Laying Test, Chipley, Florida, U.S.A.	50 weeks	Sept. 15, 1953
Missouri National Egg Laying Test, Mountain Grove, Missouri, U.S.A.	50 weeks	Sept. 15, 1953
Hunterdon County Egg Laying Test, Flemington, New Jersey, U.S.A.	50 weeks	Sept. 15, 1953
Western New York Egg Laying Test, Stafford, New York, U.S.A.	50 weeks	Sept. 15, 1953
New York State Egg Laying Test, Long Island A. & T. Institute, Farmingdale, New York, U.S.A.	50 weeks	Sept. 15, 1953
Oklahoma Egg Laying Test, Oklahoma A. & M. College, Stillwater, Oklahoma, U.S.A.	50 weeks	Sept. 15, 1953
Pennsylvania Official Egg Laying Test, Rt. 2, Harrisburg, Pennsylvania, U.S.A.	50 weeks	Sept. 15, 1953
Rhode Island Egg Laying Test, Kingston, Rhode Island, U.S.A.	50 weeks	Sept. 15, 1953

* For rules governing the tests, see World's Poultry Science Journal, Vol. 6, No. 4, Oct.-Dec., 1950, p. 292.

Reports were received in full or in part from 28 different tests. A complete tabulation is shown in the attached table. Only two items were constant in all reports —the birds entered in each breed and the percent mortality. A record of eggs per bird entered was obtained from all but one test; many reported the record of the highest bird. Body weight and egg weight data were unavailable from many tests.

In considering the possibility of international reports, and for purposes of comparing breed variables, it would appear desirable to recommend that all tests weigh their birds in the latter half of the test year when mature body weight would be assured; the weight of eggs should be reported at the time the birds are weighed.

No attempt has been made to evaluate the records in the attached report. They are presented as furnished by the supervisors of the respective tests.

Respectfully submitted,

C. S. Platt, Chairman

July 1, 1954

TABLE II

Production and mortality records by breeds.

Breed	Test	Birds entered	Eggs per bird entered	Eggs per bird that lived	Mortality	Body weight	*Egg weight	Record of highest bird
		(no.)	(no.)	(no.)	(%)	(kg.)	(gms.)	(eggs)
White Leghorn	Hawkesbury	198	176	186	11.1	1.98	61.5	256
	Burnley	24	194	199	4.2	—	—	305
	Belgium	90	184	197	15.0	—	58.1	280
	Sweden (1)	140	162	179	17.9	2.0	61.3	283
	Sweden (2)	740	216	235	13.0	2.13	61.5	328
	Denmark	640	194	212	12.7	2.07	59.3	277
	England—National	187	192	—	16.0	—	—	264
	Yorkshire	120	191	198	12.5	—	—	278
	Ireland	114	183	190	7.9	—	57.2	261
	North Ireland	276	189	202	10.8	—	64.2	294

	So. Rhodesia	45	212	221	8.8	2.15	—	293
	Johannesburg (1)	225	171	190	10.2	—	—	281
	Johannesburg (2)	280	141	170	16.0	—	—	261
	Parafield	162	—	202	8.0	—	—	268
	Cuba	39	227	—	10.2	—	56.8	286
	U.S.A.—New York State	377	207	228	18.0	—	58.6	312
	Western New York	429	243	253	8.8	2.27	—	334
	Pennsylvania	559	230	—	8.9	—	58.6	—
	Florida	546	235	251	11.0	—	58.2	321
	Arizona	247	197	227	23.5	—	58.2	309
	Oklahoma	312	252	267	11.8	2.31	58.4	339
	Storrs (Conn.)	364	234	262	16.7	—	59.1	329
	California	286	221	239	12.9	2.13	59.1	325
	Hunterdon (N.J.)	429	239	253	12.1	—	58.6	333
	Missouri	312	230	238	6.4	2.09	58.9	313
	Rhode Island	104	226	248	16.3	2.13	57.9	311
Rhode Island Red	Hawkesbury	24	135	140	16.6	2.45	62.4	236
	Burnley	46	180	186	4.3	—	—	268
	Belgium	120	209	219	9.1	—	58.8	292
	Sweden (1)	45	142	186	4.4	2.8	62.8	269
	Sweden (2)	30	227	229	10.0	2.75	60.6	270
	Denmark	110	183	195	10.9	3.0	59.8	255
	England—National	1429	204	—	9.4	—	—	296
	Yorkshire	670	205	214	9.5	—	—	318
	Ireland	288	190	196	5.2	—	57.1	298
	North Ireland	300	184	199	10.6	—	62.4	283
	So. Rhodesia	30	204	221	13.3	2.72	—	268
	Johannesburg (1)	130	151	182	16.8	—	—	258
	Johannesburg (2)	100	143	195	11.0	—	—	281
	Parafield	18	—	140	5.5	—	—	231
	Cuba	182	219	—	15.9	—	57.5	312
	U.S.A.—New York State	52	233	250	13.5	—	59.1	332
	Western New York	130	223	241	13.1	2.86	—	310
	Pennsylvania	104	238	—	9.6	—	58.9	—
	Florida	182	238	254	11.5	—	59.1	334

Breed	Test	Birds entered (no.)	Eggs per bird entered (no.)	Eggs per bird that lived (no.)	Mortality (%)	Body weight (kg.)	*Egg weight (gms.)	Record of highest bird (eggs)
	Arizona	65	210	233	21.5	—	58.4	296
	Oklahoma	26	268	281	7.6	2.63	58.4	314
	Storrs (Conn.)	260	233	248	12.6	—	59.8	316
	California	26	224	234	11.5	2.50	59.1	298
	Hunterdon (N.J.)	65	232	252	12.3	—	58.2	311
	Missouri	91	241	246	6.6	2.68	59.4	304
	Rhode Island	143	218	232	13.2	2.72	58.4	319
New Hampshire	Belgium	10	194	205	10.0	—	58.4	268
	Sweden (1)	10	159	159	0	2.8	60.5	260
	Denmark	40	184	196	7.5	2.99	60.3	231
	England—National	24	188	—	4.1	—	—	239
	Johannesburg (1)	5	188	188	0	—	—	197
	Johannesburg (2)	20	114	143	20.0	—	—	176
	Cuba	91	184	—	18.7	—	55.0	278
	U.S.A.—New York State	65	207	219	7.6	—	58.9	300
	Western New York	117	230	244	9.4	2.72	—	325
	Pennsylvania	78	196	—	12.8	—	59.1	—
	Florida	104	204	218	16.3	—	57.9	300
	Arizona	13	184	217	15.4	—	57.7	253
	Oklahoma	91	204	218	14.2	2.77	58.4	310
	Storrs (Conn.)	182	212	231	15.3	—	58.9	306
	California	26	170	196	19.2	2.86	59.1	265
	Hunterdon (N.J.)	26	218	245	15.4	—	60.1	323
	Missouri	39	222	225	2.5	2.68	57.7	295
	Rhode Island	78	210	218	6.4	2.72	57.2	285
Barred Plymouth Rock	Denmark	40	186	197	10.0	2.81	57.5	245
	England—National	26	175	—	26.9	—	—	257
	U.S.A.—New York State	13	257	276	8.7	—	59.1	331
	Western New York	39	251	263	7.7	3.09	—	308
	Pennsylvania	65	232	—	7.6	—	58.9	—
	Florida	13	217	238	15.4	—	57.2	303
	Storrs (Conn.)	208	241	252	11.0	—	59.4	325

	Hunterdon (N.J.)	13	172	232	30.8	—	57.0	259
	Missouri	39	211	237	17.9	2.95	59.4	309
	Rhode Island	117	212	233	14.5	2.81	57.2	322
White Plymouth Rock	Denmark	20	185	209	15.0	2.71	59.6	253
	U.S.A.—Western New York	104	251	263	7.7	3.09	—	308
	Pennsylvania	52	182	—	11.5	—	57.9	—
	Florida	26	187	201	15.4	—	57.2	301
	Oklahoma	91	224	230	9.8	3.30	57.7	311
	Storrs (Conn.)	104	200	213	15.3	—	59.4	288
	Hunterdon (N.J.)	13	180	180	0	—	59.1	231
	Missouri	52	196	216	15.3	2.95	59.1	269
	Rhode Island	52	194	210	17.3	2.95	57.2	282
Light Sussex	Burnley	4	151	151	0	—	—	166
	Belgium	10	168	186	10.0	—	58.7	213
	Sweden (1)	15	135	163	33.3	2.7	61.3	209
	Sweden (2)	10	195	203	10.0	2.4	62.0	289
	Denmark	80	159	188	20.0	3.06	60.3	261
	England—National	759	188	—	9.2	—	—	283
	Yorkshire	182	203	209	7.6	—	—	315
	Ireland	132	174	177	4.5	—	57.2	263
	No. Ireland	144	198	203	3.4	—	63.3	286
	Johannesburg (1)	5	198	198	0	—	—	255
	Parafield	3	99	99	0	—	—	173
Black Australorp	Hawkesbury	90	175	180	6.6	2.40	60.3	246
	Burnley	58	186	186	1.7	—	—	284
	England—National	19	139	—	21.0	—	—	224
	Ireland	6	146	146	0	—	57.3	204
	So. Rhodesia	25	220	228	4.0	2.95	—	313
	Johannesburg (1)	235	164	192	14.9	—	—	242
	Johannesburg (2)	80	170	194	13.4	—	—	250
	Parafield	150	—	190	3.3	—	—	281
	U.S.A.—Oklahoma	52	211	234	19.2	2.81	56.8	289
	Missouri	39	198	219	17.9	2.68	58.9	285
White Wyandotte	Sweden (1)	10	128	142	10.0	2.4	59.5	187
	Denmark	40	144	172	35.0	3.0	58.7	230

Breed	Test	Birds entered (no.)	Eggs per bird entered (no.)	Eggs per bird that lived (no.)	Mortality (%)	Body weight (kg.)	*Egg weight (gms.)	Record of highest bird (eggs)
	England—National	114	176	—	8.7	—	—	261
	Yorkshire	50	180	197	16.0	—	—	260
	Ireland	120	185	201	13.3	—	57.2	277
	No. Ireland	66	153	179	24.2	—	64.4	268
	U.S.A.—New York State	13	241	250	8.7	—	59.4	286
	Oklahoma	13	221	221	0	2.59	57.0	275
	California	26	237	237	0	2.45	59.1	302
	Missouri	13	205	218	15.4	2.72	60.1	280
	Rhode Island	13	202	202	0	2.81	59.1	228
Brown Leghorn	Burnley	8	146	146	0	—	—	194
	Sweden (1)	45	134	150	15.6	2.1	60.7	223
	Sweden (2)	20	176	204	20.0	2.0	60.1	266
	Denmark	170	174	198	15.9	2.06	58.5	260
	England—National	144	170	—	9.7	—	—	240
	Ireland	6	187	187	0	—	57.2	244
	No. Ireland	36	173	179	5.5	—	63.6	221
	U.S.A.—Oklahoma	26	159	168	23.0	2.22	58.9	264
	Hunterdon (N.J.)	13	225	225	0	—	57.5	269
Black Leghorn	Burnley	2	165	165	0	—	—	205
	England—National	210	180	—	7.1	—	—	256
	Yorkshire	120	193	201	7.5	—	—	269
	No. Ireland	60	179	189	8.3	—	63.6	251
	Parafield	3	138	138	0	—	—	186
Ancona	Hawkesbury	6	145	160	16.6	3.8	57.7	185
	Burnley	2	174	174	50.0	—	—	174
	England—National	17	140	—	11.7	—	—	191
	No. Ireland	6	203	203	0	—	61.9	235
	Parafield	3	—	171	0	—	—	191
	U.S.A.—Pennsylvania	13	201	—	15.3	—	57.7	—
California Gray	U.S.A.—New York State	26	190	214	19.2	—	55.4	277
	Oklahoma	13	231	231	0	2.77	57.2	256

	California	26	190	216	30.0	2.40	59.1	260
	Hunterdon (N.J.)	13	217	220	7.7	—	56.8	274
Langshan	Hawkesbury	18	137	145	5.5	2.31	62.2	193
	Burnley	4	237	237	0	—	—	273
	Parafield	6	188	188	0	—	—	256
Black Minorca	U.S.A.—Oklahoma	13	202	219	7.6	2.68	59.1	268
	Hunterdon (N.J.)	13	143	164	30.8	—	59.6	199
Columbian Plymouth Rock	U.S.A.—Missouri	13	162	170	7.7	2.81	55.8	210
	Rhode Island	13	202	202	7.7	2.86	56.8	261
Buff Plymouth Rock	England—National	120	176	—	10.8	—	—	258
	Yorkshire	71	210	211	4.2	—	—	284
	No. Ireland	6	167	201	16.6	—	61.0	238
Lamona	U.S.A.—New York State	13	147	146	23.1	—	57.2	193
White Sussex	England—National	13	153	—	23.0	—	—	229
White Australorp	Johannesburg (2)	30	154	165	6.6	—	—	257
White Laced Red Cornish	U.S.A.—Oklahoma	13	81	91	30.7	2.45	51.1	141
Legbar	Burnley	8	167	179	12.5	—	—	232
	England—National	12	131	—	25.0	—	—	186
Dark Cuckoo Maran	England—National	1	165	165	0	—	—	165
Rhodebar	England—National	18	166	166	0	—	—	267
North Holland Blue	England—National	12	165	—	16.6	—	—	228
Double Laced Barnevelder	England—National	7	181	—	0	—	—	175
Red Wyandotte	England—National	6	189	—	0	—	—	229
Welsummer	England—National	9	125	—	22.2	—	—	175
Cruzades	Cuba	65	155	—	33.8	—	57.0	313
C. del Prat Leonadas	Cuba	39	182	—	7.6	—	57.9	258

Breed	Test	Birds entered (no.)	Eggs per bird entered (no.)	Eggs per bird that lived (no.)	Mortality (%)	Body weight (kg.)	*Egg weight (gms.)	Record of highest bird (eggs)
In-Cross	U.S.A.—New York State	13	201	235	30.8	—	57.9	292
	Florida	208	235	261	20.7	—	57.2	326
	Arizona	143	228	242	18.2	—	58.4	321
	Missouri	117	202	224	17.9	2.36	58.4	295
	Rhode Island	26	224	239	7.7	2.13	56.8	286
Crossbred	Belgium	10	216	243	20.0	—	61.6	265
	Parafield	12	214	214	0	—	—	234
	U.S.A.—New York State	117	246	259	8.6	—	58.9	320
	Western New York	65	230	241	9.2	2.54	—	314
	Pennsylvania	104	226	—	13.4	—	58.6	—
	Florida	78	234	242	9.0	—	59.4	317
	Arizona	117	190	225	25.6	—	58.4	306
	Missouri	104	217	238	10.5	2.72	59.8	321
	Storrs (Conn.)	208	226	235	9.1	—	59.1	325
	California	104	208	246	25.0	2.45	59.1	326
	Hunterdon (N.J.)	13	227	242	15.4	—	56.8	274
	Rhode Island	104	209	224	11.5	2.68	58.4	305
Sex-link	New York State	13	226	239	23.1	—	59.6	301
R.I.R. x L. Sussex	England—BOCM (1)	36	179	—	13.8	2.98	60.7	—
	BOCM (2)	98	164	—	13.2	—	—	—
R.I.R. x W. Wyan.	BOCM (1)	12	189	—	0	3.06	61.6	—
Bl. Leg. x R.I.R.	BOCM (1)	12	169	—	25.0	2.91	61.9	—
	BOCM (2)	168	165	—	14.8	—	—	—
L. Sussex x R.I.R.	BOCM (1)	12	197	—	0	2.84	57.9	—
Br. Leg. x L. Sussex	BOCM (1)	24	168	—	8.3	2.77	61.0	—
Hybrid	BOCM (1)	12	250	—	8.3	1.77	54.8	—
	BOCM (2)	70	179	—	10.0	—	—	—
L-H Cross	BOCM (2)	231	160	—	18.6	—	—	—
H-L Cross	BOCM (2)	42	134	—	23.8	—	—	—
Heavy Cross	BOCM (2)	63	199	—	11.1	—	—	—

*U.S.A. egg weights derived from the point system which did not give any credit to eggs weighing over 61.5 grams (26 oz. per doz.)

THE ROLE OF INTERNATIONAL ORGANIZATIONS IN THE WORLD'S POULTRY INDUSTRY*

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Although there exist several organizations which deal with poultry production on a more or less international level, there is no doubt that the World's Poultry Science Association is not only one of the oldest bodies in this field, but also the most international in scope. It was established 42 years ago by experts from 26 countries as the "International Association of Poultry Instructors and Investigators" as an association to promote the welfare and prosperity and happiness of all the nations.

Two world wars and several other hostilities caused a heavy toll to many nations and also inflicted widespread devastation on the poultry industry. The World's Poultry Science Association was one of the first non-governmental international organizations to function after the autumn of 1918 as well as after the spring of 1945 and to make a worthwhile contribution.

Three well-attended World's Poultry Congresses have been held and several very active country branches established. The World's Poultry Science Journal begun in the spring of 1945, has been improved and enlarged.

The question of closer cooperation with the Food and Agriculture Organization of the United Nations arises. FAO membership includes 71 countries at the present time and it is expected that more will join in due course. The idea of FAO was conceived in 1943 and the Organization established in 1945 in order to promote the common welfare by furthering action for the purpose of:

raising levels of nutrition and standards of living of peoples;
securing improvements in the efficiency of the production and distribution of food and agricultural products;
bettering the condition of rural population;
and thus contributing toward an expanding world economy.

The Organization collects, analyses, interprets and disseminates information relating to nutrition, food and agri-

*Parts of an address delivered at the Triennial Meeting of the World's Poultry Science Association, Aug. 20, 1954, Edinburgh, Scotland.

culture. In the field of poultry industry, for example, a study on feeding of chickens in European countries is being prepared in English, French and Spanish. In 1953 the post of a poultry specialist was established in the Animal Production Branch in order to strengthen this part of FAO's work.

FAO also promotes and recommends action with respect to (a) research; (b) the improvement of education and the spread of nutritional and agricultural science and practice; (c) the conservation of natural resources and the adoption of improved methods of agricultural production; (d) the improvement of processing, marketing and distribution of food and agricultural products.

You will be interested to learn that in furtherance of those objectives a ten-day FAO Technical Meeting on Poultry Production for Asia and the Far East will probably be held in January 1955 in Lucknow, India. Keeping in line with our general policy of the closest possible cooperation with other international organizations, whether governmental or non-governmental, we should be very happy to see the World's Poultry Science Association take an active interest in this meeting, which will probably be followed by similar meetings in other regions of the world.

FAO also furnishes such technical assistance as member governments may request. In the field of poultry production, experts have so far been provided to the following countries: Burma, Ceylon, Pakistan, Thailand and Yugoslavia. Incidentally, all of these FAO experts were members of the World's Poultry Science Association. Furthermore, fellowships for technical training and study in poultry husbandry and marketing were granted to persons from Pakistan, Syria, Thailand and Yugoslavia. Some countries in which FAO experts were working received limited amounts of poultry equipment from FAO.

We are well aware, of course, that much more should be done in rendering services to the poultry industry in many countries. We also very much appreciate the activity of other organizations such as the Colombo Plan, the U.S. Foreign Operations Administration (FOA), the Organization for European Economic Cooperation (OEEC) and other bodies.

It seems to be obvious that the activities of both the World's Poultry Science Association and the small Poultry Section of FAO are aimed at reaching the same target. In order to make the most efficient use of the relatively small funds which are available to both, close cooperation and, in some cases, also coordination would be highly desirable. In

many cases FAO would appreciate the advice of the World's Poultry Science Association on its program of work.

In again stressing the need for intensified cooperation by all who are interested in the development of an economic poultry production throughout the world, I should like to quote two sentences which Frank L. Platt, the editor of "Everybody's Poultry Magazine," wrote in 1950. He said: "What a wonderful atmosphere would surround the poultry business if the fine fraternal spirit each poultryman has on the inside of him were joined in a broad unity of purpose. It is in such a community of interest that the competence develops to meet the problems that press down their burdens, weighing heavily even on the strong who are alone and unaided."

TOM NEWMAN INTERNATIONAL AWARD

Mr. John R. Harvey, the Secretary of the Tom Newman International Award announces that the Award Committee in the United Kingdom has decided that the '1954' Award shall be made to Dr. W. Bolton of the Poultry Research Centre, Edinburgh, Scotland.

The Award consists of a handsome medal and £50 sterling. It is given for what in the opinion of the Award Committee, meeting in London, is the most important contribution to poultry husbandry research work published in the previous year, for the benefit of poultry husbandry.

The Award, instituted in 1948 by Poultry Association of Great Birtain, has been won on 5 occasions by U.S.A. research workers and once before by a United Kingdom research worker.

There are Corresponding Secretaries for the Award in every country where poultry husbandry is developed into an industry.

Amongst the members of the Award Committee in the United Kingdom are Dr. H. Temperton, (National Institute of Poultry Husbandry), Dr. E. T. Halnan, Cambridge, and Mr. Michael Pease, Cambridge).

The Award was made to Dr. Bolton for work published in 1953 as under:

The Effect of Sex Hormones on Comb Growth in Immature Pullets.

Observations on the Vitamin Metabolism of the Common Fowl:

The effects of Oestrogen and Progesterone Injections in Immature Pullets on the Riboflavin Content of the Magnum.

The effects of Oestradiol Dipropionate, Testosterone Propionate and Progesterone Injections in Immature Pullets on the Riboflavin Content of the Magnum,

following excellent research work on Riboflavin which Dr. Bolton had done and published in earlier years.

Dr. Bolton received the degrees D.Sc., A.R.I.C. from King's College, Newcastle-upon-Tyne (University of Durham). He was on the staff of King's College from 1936 to 1937 engaged on work relating to soil science, with particular reference to soil surveys. From 1937 to 1948 he was at The Queen's University of Belfast and in the Ministry of Agriculture for Northern Ireland. Since 1948 he has been on the staff of the Agricultural Research Council at the Poultry Research Centre, Edinburgh.

On taking up the appointment at Belfast he was at first engaged on problems of pig nutrition. About 1940 the emphasis was changed from pigs to poultry, and since then the main research activities have lain in the field of poultry nutrition. Most of the work has been directed to problems in nutritional chemistry, particularly in the laying hen, where profound differences in body chemistry and in nutritional needs exist between the non-laying and laying condition.

Dr. R. H. Common (MacDonald College, Quebec) admires the Poultry Association of Great Britain's Tom Newman award. From left to right, after Dr. Common are Miss Jane Cox (Eire), Dr. R. C. Warren (U.S.A.), Dr. Bolton, and Dr. D.G.M. Wood-Gush (Poultry Research Centre, Edinburgh)

POULTRY IN SOUTHERN RHODESIA

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CLIMATE. Although Southern Rhodesia lies within the tropics in Africa the greater portion of the territory and practically all of the agriculturally developed land is sub-tropical, as it is a high plateau ranging from 3,000 to 6,000 feet above sea level.

The climate is ideal for poultry, with a temperature range of 28° F. to 100° F. from the coldest winter night to the hottest day. The rainfall is largely confined to five months in summer, i.e., December to April. The breeding season for laying stock is during the winter and therefore stock can be reared frequently without so much as encountering a single drop of rain prior to reaching sexual maturity and of course with the maximum sunshine daily. Large areas consist of granite sands which are well drained and ideal for poultry. The only drawback climatically is rather sudden changes in temperature which may occur on occasion, especially in early Spring, when a day temperature of 90° F. may drop to 55° F. within twelve hours, caused by cold winds from the south. Apart from this, which happens infrequently, the climate and conditions for poultry may be considered the equal of any in the world.

POPULAR BREEDS. Until recently the White Leghorn has been the most popular breed kept by European poultry farmers, but the improvement in egg production of the dual purpose breeds such as Rhode Island Red, New Hampshire, and Black Australorp, has resulted in more and more of these being kept. The Black Australorp in particular produced in the southern hemisphere is well acclimatised and here is well represented by excellent strains. Crossbreds for commercial production are very popular, and the White Leghorn x Black Australorp meets local conditions extremely well and has been used for many years. The pullets are excellent producers, early maturing, and very little inclined to broodiness. They give a good sized carcase as culls. The cockerels and pullets are almost entirely white, and being quick maturing produce a useful table bird at all ages. The White Leghorn x New Hampshire or Rhode Island Red are also excellent crosses if from good strains. Very few other breeds are kept, though Light Sussex are becoming more popular.

Amongst turkeys, the Bronze is supreme, though Beltsville Small Whites are being bred. Turkeys are very well suited to local conditions and increase rapidly with very little attention.

Ducks and geese are not very popular, but of the former Pekins and Muscovy do well. A Pekin x Muscovy is raised for table ducks on some farms where they are largely allowed to fend for themselves.

FEEDS. The main cereal feed available is maize, though sorghum and sunflower are also used, and also a local millet which is greatly relished. No wheat, oats, or other cereal is available for poultry feeding, but wheaten offals from flour manufacture from imported wheat are available for mixing of mashes.

The protein feeds produced are meatmeal and ground nut meal, but some fishmeal is imported also. Other feeds available are cottonseed meal, palm kernel meal, rice bran, and maize by-products.

Manufacturers of stock feeds produce good rations under government regulations of sale.

HOUSING. The climate does not call for elaborate housing and on general farms it consist frequently of roosting quarters only, where about one square foot per bird is allowed. Birds are usually penned however, as vermin are prevalent. The pens may be bare yards or more frequently are today down to deep litter.

The houses are usually of brick under asbestos, iron, or thatch, with open front. Where roosting accommodation only is provided the floor is usually of concrete to control sand fleas, but where poultry are kept in deeper laying houses, litter is provided all over the floor area.

Brooding is done by the cold box brooder system for small flocks where no artificial heat is required and fine hardy chicks are produced by this method. Where power is available Infra Red heat lamp brooding is becoming very popular and is ideal for local winter conditions. Brooder houses are permanent and the brooding period to three or four weeks. Rearing then is usual in portable shelters on free range or in large camps or may be in permanent rearing houses with littered pens.

DISEASES AND CONTROL. Flocks are not large and, being scattered, disease is not prevalent. Bacillary White Diarrhoea is controlled by compulsory testing of all flocks from which stock is sold, except for slaughter. It is not widespread,

but it is hoped by these means to keep the disease completely controlled. Typhoid can be troublesome and is fairly widespread amongst native stock. Respiratory diseases occur where management and conditions are faulty. Leucosis has been imported and as in most countries is accounting for a fairly high percentage of the losses. Chicken pox is completely under control by regular live virus vaccination. A free State Veterinary Service is provided involving laboratory examination and advisory services.

RESEARCH AND EDUCATION. Research is in its infancy but there are four government stations engaged in some research on local problems including breeding of pedigree stock for sale to farmers, conducting trials under various housing systems under different climatic conditions, feeding of farm produced fish, Egg Laying trials, etc. There is one European College of Agriculture where Poultry Husbandry is included in the Diploma syllabus and where short courses are held. In addition Young Farmers' Clubs at many of the schools run poultry projects. In Native Agriculture one station is specializing in the breeding of table poultry suitable for native farmers' conditions, and here also practical instruction is given.

Native Agriculture generally is still primitive but great improvement is taking place guided by a special Government Department entrusted with this task. Poultry of nondescript type have always been kept by natives and it is of interest to note the influence of the "naked neck" fowl which must have been introduced in very early days to the East coast by Arab and Portuguese traders. Most of this stock is very hardy, lays few eggs, but provides considerable food, and is reared mainly on waste grains.

MARKETING. The marketing of poultry products is uncontrolled and also unorganized. Voluntary Co-operatives have been formed but have failed because the market is limited and direct producer-consumer sales can always undersell organizations with higher handling costs. Some storage is undertaken by the Cold Storage Commission and at times surplus has been exported as liquid egg.

The industry though small is growing steadily and the foundation has been laid on sound lines for future development following the establishment of the Federation of the Rhodesias and Nyasaland.

PLANNING FARMS TO MAINTAIN HEALTHY FLOCKS

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No poultryman would build a house without careful consideration of construction details. It is equally important to plan the location of a house and the general layout of a farm and its operation with the objective of developing a program to (1) keep diseases at a minimum and (2) keep diseases that occur under reasonable control.

The fact that the relative success of disease control plays such a vital part in determining success or failure of a poultryman demands that a farm operation be planned to assist disease control measures. But it is only being realistic to accept the fact that, regardless of precautions, any group of birds may contract a contagious disease. If this fact is accepted it is only prudent to arrange a farm and farm operational procedure so that a minimum of damage is done in the event of a disease outbreak.

The size and nature of a poultry enterprise determine to a large degree the type of management and location that is practical. Almost any operation can make use of at least a few of the following ideas:

1. If a farm is to be started from scratch, pick a location as well isolated from other poultry as is practical.

2. Locate ranges and houses well back from highways. Material blowing from dirty crates or from infected birds trucked by is not a drug to help keep your birds healthy.

3. Keep various age groups of birds well separated. It is frequently practical to completely separate growing stock and adult stock by maintaining separate farms or separate units on one farm. In either case there should be no transfer of equipment or workers between units or the primary objective will be defeated. Such a separation of age groups allows for annual depopulation—one of the best ways to break the cycle of disease transmission. Hens can be sold and the premises thoroughly cleaned before ready-to-lay pullets are housed. Broiler growers have long recognized the importance of this approach and have largely adopted an all-in, all-out system. This allows for regular depopulation and cleanup under an established orderly production schedule. The same general idea can be applied by many egg producers. Separation of age

groups is necessary both physically and from the standpoint of time between groups. Keep a minimum number of ages of birds and space the ages as widely as possible. Such an approach is helpful in controlling the spread of diseases and is necessary for a good immunization program.

4. In a large operation divide birds into units on a basis of what one person can take care of. Use separate grain rooms and equipment for each worker's group of birds and avoid all unnecessary tracking between groups.

5. Construct buildings to prevent rat invasions. Declare war on them and don't be tricked into an armstice.

6. Screen windows, doors, and other openings to keep out wild birds. There is no doubt that wild birds can carry diseases either by mechanical transportation or by actual infection. Keep them out.

7. Don't allow possible contaminated material to be brought on the place. This goes for crates, trucks, dirty feed bags, egg cases, etc. Adopt the policy that these items must be in a sanitary condition or they will not be allowed on the place. Use a fence if nothing else works.

8. Visitors. It's not realistic to suggest that no visitors be allowed on the place, but it is realistic to demand that necessary visitors take satisfactory precautions to prevent bringing you disease problems from neighboring farms. Demand that salesmen, servicemen, buyers, extension, and service workers wear clean clothes and freshly cleaned and disinfected boots or rubbers if they are to go in houses or on ranges.

9. This list is not all inclusive. Factors such as a sound immunization program, optimum nutrition and housing, satisfactory dead bird disposal, fly control, sound range management, careful culling, prompt diagnosis of apparent disease problems, and additions of only disease-free stock are other important considerations.

The first line of defense has the objective of keeping diseases off the place. The second line of defense has the objective of keeping under control any disease that slips by the first line. Both lines should be manned at all times. (Featheredfax)

LIGHTING THE WAY TO MORE TURKEYS

The Thanksgiving Turkey is welcome on dinner tables the year round. Unfortunately, though, he can't accept all his invitations. By nature, as well as tradition, he reaches good roasting size in autumn or early winter. Three-fourths of our turkey crop—which will total nearly 56 million birds this year—goes to market between Labor Day and Christmas.

Growers need more turkey poults to raise for market in late winter, spring, and summer. Scientists at ARA's Beltsville poultry farm now find that proper use of light can help provide them.

Giving hens extra light to get more eggs sooner isn't new, of course. Turkey breeders use this method to obtain earlier poults. But a spring and summer decline in egg fertility, resulting in fewer turkeys later in the year, plagues many breeders. This premature drop in fertility and hatchability has occurred also at Beltsville.

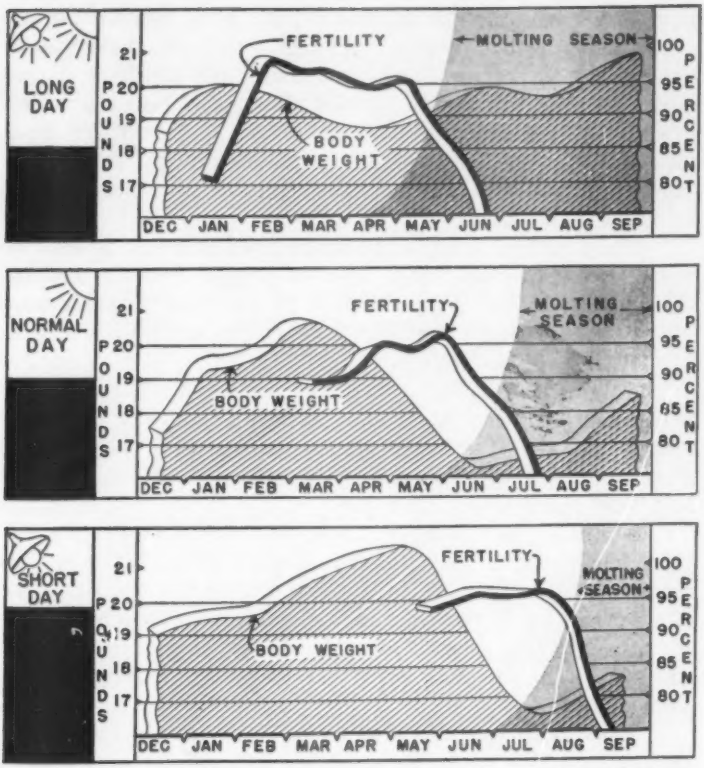
In the research-center breeding pens, electric lights go on early in December, lengthening winter days to a summerlike 14 hours. In 3 or 4 weeks the turkey hens begin laying (age: about 8 months). With sunlight alone, egg production usually doesn't start till early March.

Both hens and turkey males reach sexual maturity earlier under supplemental light. Breeding usually goes well the first few months. But soon—sometimes even in March or April—more and more eggs are found infertile. By June or July hatches of Beltsville Small White poults may be down to 50 per cent or less of eggs laid.

M. W. Olsen and S. J. Marsden of the Bureau of Animal Industry observed that molting (gradual loss and regrowth of feathers) was well advanced in the male birds when the decline in fertility began. The hens, however, kept their old plumage and stayed in good egg production.

The scientists knew that length of day influenced molt, just as it affects other changes in animals and plants (AGR. RES., May-June 1953). But what was the relation between light-day molt, and turkey fertility?

In studies during the past 3 years, Olsen and Marsden found that too much early-season light directly causes early molt and loss of fertility in Beltsville Small White toms. Either long light-days or high light intensity, they discovered, can advance the onset of molt. Short days or less intense light postpone molting. Behavior of individual males varies widely, but



How length of day affects the molting and fertility of turkey males

Top—14-hour day, obtained using electric lamps to supplement sunlight during winter and spring, makes hens lay about 2 months sooner than they would otherwise. This lengthens breeding season in early months of the year. But Beltsville studies show that too-intense artificial light can cause premature molt in males. Sharp drop in body weight precedes molt, and decline in fertility follows. Effective breeding period usually ends by June.

Center—11-hour-day is about the average provided by sunlight in early months of the year. With days of this length, turkey males usually don't molt until May. Their loss of fertility also occurs later. But since hens without artificial light do not begin laying before March, effective breeding period for turkeys on normal light-days may actually be shorter than for birds given supplemental light to increase effective day, as shown in chart above.

Bottom—8-hour-day, maintained artificially during first 5 months of the year, delays molting until near end of summer and prevents mid-season loss of male fertility. Turkey toms kept in reserve by this method must be segregated from other birds. Early breeding is done with males given same 14-hour day as hens. The short-day or "cold storage" males are put into the breeding pens about mid-May, after they are gradually acclimatized to the longer days.

in general their fertility declines rapidly after molting begins.

The researchers explain that light enters the turkey tom's eye, passes to the brain, and stimulates his pituitary gland, which in turn affects the thyroid. Hormones released by an overactive thyroid cause loss of weight and feathers, then diversion of body energies from sperm-cell production to growing new plumage. Light has much greater influence on molt in males than in hens.

The practical value of these findings is clear. It may be possible, for instance, with light of proper duration and intensity, to advance egg production in the hens without causing premature male infertility. Research on early-season lighting practices is continuing.

Another possibility also looks attractive. When turkey males are limited to an 8-hour, artificial light-day from December to April, their molt can be delayed until July or August. Therefore breeders may wish to hold some toms in sunless "cold storage" for later use.

Beginning in mid-April, these birds would be given gradually longer days. (A too-abrupt change might bring on immediate molt.) Their fertility (low during the short-day period) comes up to normal and will hold well through the rest of the egg-laying season. About mid-May, these reserve toms are put in the breeding pens to replace males that are past their peak fertility.

Thus, with two shifts of males—and proper light use—turkey breeding might be extended successfully over 7 or 8 months (instead of the usual 4 or 5), and growers could supply tender young roasting turkeys for consumers' tables during more months in the year. (Agricultural Research, U.S.D.A.)

THAILAND GOVERNMENT LIFTS BAN ON EXPORTS OF POULTRY AND EGG PRODUCTS

The Thai Government recently has permitted the export of poultry meat and eggs. The export of these items cannot be expected to be of much consequence but does demonstrate these goods are now being produced in exportable amounts. The exportation of chicken meat and eggs are not entirely free since export permits are necessary. (Foreign Crops and Markets U.S.D.A.).

LYMPHOMATOSIS—POULTRY'S WORST DISEASE

In a small laboratory in Michigan, scientists are waging war against the most defiant and deadly enemy of poultry. This enemy is lymphomatosis—the disease that is to chickens what cancer is to man.

The poultry industry is watching every move, every step forward. Victory will help producers save the $75 million a year they now lose in this disease. Medical scientists are following the work for leads in fighting human cancer.

Lymphomatosis is a penalty of progress. Although it existed years ago, it caused little trouble until our poultry industry began to use modern production methods. Forced-draft incubators, mass brooding, and interstate shipments of chicks were ideal for spreading the disease.

In the early twenties, poultrymen began reporting strangely sick chickens. Some victims had paralyzed legs or wings. Many had pale or bluish combs and wattles, others grayish eyes. Some flocks were hit harder than others; none was immune. Deaths ran 5 to 50 percent.

These symptoms were typical of the three known types of lymphomatosis. It attacks the nerves (neural type), the internal organs (visceral types), or the eyes (ocular type).

By the late thirties, scientists and farmers in the big poultry States saw the need for an all-out attack on lymphomatosis. They asked USDA to take the lead. The Department responded in 1939 by establishing the Regional Poultry Research Laboratory at East Lansing, in cooperation with 25 north central and northeastern State experiment stations.

Scientists there have been using every available resource to conquer this disease, which *in one week* costs poultrymen nearly as much as the *entire cost* of building and operating the laboratory these 15 years.

The scientists are slowly gaining ground. Let's look at these gains.

First, we've learned that lymphomatosis is an infectious, contagious, malignant disease, caused by filterable virus. Researchers haven't isolated the virus, but they've transmitted the disease to chicks by inoculating them with filtered extracts of blood, tissues, and secretions or excretions from infected birds.

In addition to the three forms of lymphomatosis, there are several related diseases. One called osteopetrosis or marble bone causes enlargement and hardening of the long bones. An-

NEURAL lymphomatosis (fowl or range paralysis) is second biggest killer, easiest to detect. Legs, wings, neck become paralyzed, causing unsteady gait, inability to walk, or drooping wings. Postmortem shows nerves enlarged, discolored tannish gray to brown.

VISCERAL lympomatosis (big-liver disease) is biggest killer, hardest to detect. Pale or bluish comb or wattles and rundown appearance are symptoms but not certain indication. Enlarged, tumorous liver (left) is sure sign. The other liver came from a normal chicken.

OCULAR lymphomatosis attacks eyes, often causes blindness. Irises lose color, appear gray or light tan. Pupils become restricted, often distorted, don't dilate at death. This form of lymphomatosis is sometimes called iritis, pearly eye, fishy eye, or gray eye.

other affects the blood-cell-forming tissues in the bone marrow. A number of leukemic forms attack the red and white corpuscles.

All these conditions, together, are called the avian-leukosis complex. Whether they're all caused by a single virus is not yet known. The fact that investigators at one laboratory often can't verify results at another suggests they may be dealing with different viruses.

Second, the scientists know that lymphomatosis is transmitted through the egg from hen to chick, and by contact—direct or indirect.

When research began at the laboratory in 1939, only eggs were brought in. The chicks were hatched and reared

in new, quarantined buildings. Yet, within 6 weeks after hatching, lymphomatosis appeared.

In 1950, infectious bronchitis broke out among the laboratory flocks. All chickens and eggs were destroyed, except for some breeding stock that was salvaged and taken to a new isolated location on the premises. Buildings were left vacant several months and were scrubbed and disinfected before more eggs were hatched. Nevertheless, lymphomatosis reappeared within a short time.

Except for this one outbreak of bronchitis and some coccidiosis, the flocks have been entirely free of diseases and parasites. But the stringent measures that produced this unprecedented health record haven't prevented lymphomatosis.

Direct transmission experiments were also conducted. G. E. Cottral and coworkers inoculated groups of day-old chicks with filtered extracts of liver tissue from embryos and from newly hatched chicks. Both embryos and donor chicks were apparently normal and were from clinically normal parents. After 300 days there were many more cases of visceral lymphomatosis among the inoculated chicks than among the controls. These experiments showed that the virus was present in the embryo, circulating blood, and day-old offspring of some hens. Hence, clinically normal birds may carry the disease and transmit it through the egg.

Tests just completed show conclusively that lymphomatosis is spread by contact in hatching and brooding. B. R. Burmester and R. F. Gentry inoculated day-old chicks with oral-nasal washings and with extracts of feces from infected chicks. Both produced visceral lymphomatosis.

Chicks that had been inoculated when young shed the virus in their feces as adults, even though they were clinically normal. This was further proof that clinically normal birds may carry the disease.

Another interesting fact came to light: extract of infected feces failed to produce the disease when mixed with an extract of feces from normal chickens. Apparently, feces of normal noninoculated birds contains something that inactivates the virus in infected feces.

Third, the scientists have reduced—but not eliminated—the incidence of lymphomatosis by hatching and breeding chicks in isolation. Experiments by N. F. Waters and J. H. Bywaters showed fewer cases in chicks exposed after 30 days than among those exposed earlier. Isolation and quarantine measures followed at the laboratory, however, wouldn't be

practical on most poultry farms.

Fourth, the researchers found that some chick lines or strains are much more lymphomatosis-resistant than others. By intensively inbreeding White Leghorns for 14 years, Waters has obtained both susceptible and resistant lines. The most resistant line shows about 10 percent mortality from lymphomatosis, the most susceptible line about 50 percent.

Attempts thus far to prevent or treat lymphomatosis with vitamins, hormones, antibiotics, and vaccines have failed. So have efforts to develop serological tests that would detect the virus in clinically normal chickens. Such a test would be invaluable in finding carrier birds so they could be removed from a flock, thus eliminating transmission of the disease through the egg.

Logical questions at this point are: Where do we go from here? What are the greatest obstacles?

Scientists at the laboratory say one of their greatest handicaps is lack of birds known to be free of lymphomatosis virus. Results can't be measured with confidence if experimental chicks may already be infected.

To develop unquestionably free stock would require that eggs from individual hens be hatched separately and the chicks rigidly quarantined for 600 days or longer. If a single chick showed infection, the entire lot would have to be discarded—until one family was found that lived for a long period free of the disease. From this family a lymphomatosis-free population would be developed.

Another difficulty is the long period before the disease is fatal or even recognizable and the relatively few birds that get sick at any one time. In this respect, lymphomatosis is unique among poultry virus diseases. (Chickenpox, for example, usually affects a whole flock within 2 weeks.) The time factor could be partly overcome by running a number of experiments simultaneously. This, of course, would take extra facilities.

Director Berley Winton emphasizes that scientists at the laboratory and cooperating stations aren't discouraged. They point to the years of research and education required to stop pullorum disease, and to the progress now being made against polio. They feel much as scientists working on human cancer do—given the resources, they will one day conquer poultry's most dread disease. ("Agricultural Research," U.S. Dept. of Agr., Washington, D.C., June, 1954).

TOLERANCE OF GROWING CHICKENS TO SOLUTIONS OF HAWAIIAN SALT[1]

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The salinity of water from artesian wells on numerous islands and atolls of the Pacific may vary inversely to the rainfall. During prolonged periods of dryness, ocean water may encroach upon the subterranean fresh-water reserves, causing artesian well water to become brackish. On the island of Oahu in the Hawaiian Islands, for example, wells in certain parts of the island have become characteristically salty. Recently, poultry farmers, whose leaseholds have expired in and near Honolulu, have inquired about the possibility of moving to new locations where the only water that is available is brackish. This investigation was undertaken during 1952-53 to obtain more detailed information concerning the fowl's ability to tolerate brackish water.

REVIEW OF LITERATURE

Edwards (1918) has reported that salt solutions containing 3.3 and 4.5 grams of salt per kilogram of body weight were lethal when injected into the crops of pigeons, whereas 2.5 grams of salt per kilogram of body weight did not result in any symptom of distress. Quigley and Waite (1932) found that baby chicks responded favorably to the inclusion of salt at 1 per cent of the feed mixture, but that lesser gains were made at higher salt concentrations. More than 5 per cent salt resulted in a pronounced retardation of growth and excessive mortality. They reported that 4.0 grams of salt per kilogram of body weight caused the death of chicks in 5.5 to 9.0 hours when given in a single dose; 5.0 grams caused death when given in two equal doses, and 7.0 grams when given in three doses. Halpin *et al.* (1936) reported that day-old chicks grew well on rations containing 1 per cent salt, that 2 per cent was neither injurious nor advantageous, but 5 per cent retarded sexual maturity and subsequent egg production. Kare and Biely (1948) found that death among young chicks ensued when the level of salt in the feed reached 4.18 per cent

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of the mash intake. Some chicks given 6.68 and 8.18 per cent salt were alive after 29 days, but their growth rate was retarded. Chicks given 2 per cent salt in their drinking water died within a week. In the tests conducted by Barlow *et al.* (1948), 3 per cent salt of total ration was considered to be the minimum toxic level as determined by livability and growth rate.

MATERIALS AND METHODS

Day-old chicks were given graded concentrations of brackish water ranging from 0 to 550 grains of salt per gallon of drinking water in a series of three trials that lasted 6 weeks. Six-week-old cockerels were fed concentrations of salt ranging from 4.4 to 400.0 grains per gallon in two trials that lasted 6 weeks, while pullets were tested on these concentrations of salt from 7 to 25 weeks of age in a single trial. New Hampshire chicks and growing birds were used exclusively in these studies.

The brackish water fed in trials 1, 2, and 3 was made by dissolving Hawaiian salt (dehydrated ocean water) in distilled water at the rate of 0.0648 gram of salt for each grain of salt required per gallon. Tap water, containing approximately 4.4 grains of salt, was substituted for distilled water in trials 4, 5, and 6. According to Fujimoto (1954), the salt used in these trials contained 57.9 per cent chlorine, 38.6 per cent sodium, 0.18 per cent calcium, 0.42 per cent magnesium, and 0.004 per cent acid-insoluble matter.

Aside from the rations shown in Table I, no other nutrients were provided in these trials. Feed and water were presented *ad libitum*, but continuous light was provided only in trials 1 to 3.

The chicks were reared in standard electric battery brooders to 3 weeks of age and then transferred to unheated grower batteries. The cockerels and pullets tested in trials 4 to 6 were reared in confinement in developer pens described by Rosenberg and Guillou (1951).

RESULTS

Day-old chicks

The data collected in trials 1, 2, and 3 showed that day-old chicks can safely tolerate Hawaiian salt at concentrations up to 150 grains of salt per gallon of drinking water to 6 weeks of age. At 200 grains of salt and higher, the results of trials 1 and 2 were not in good agreement. Whereas 5.3 per cent died in trial 1 among the chicks fed 200 grains of salt per

TABLE I

Starter and grower rations fed in this investigation.

Ingredients[1]	Starter ration fed in trials 1, 2, and 3	Grower ration fed in trials 4, 5, and 6
Ground wheat	20.0	17.5
Whole wheat	0.0	10.0
Ground yellow corn	30.0	21.0
Cracked yellow corn	0.0	20.0
Ground oats	8.25	9.0
Meat and bone meal	5.0	0.0
Herring meal	5.0	4.2
Soybean oil meal	26.0	12.5
Alfalfa meal	5.0	4.2
Ground oyster shell	0.25	0.5
Defluorinated phosphate[2]	0.0	0.6
Iodized salt	0.5	0.5
Manganese sulfate, gm.	10.0	5.0
Delsterol, gm.[3]	15.0	10.0
Choline chloride, gm.[4]	125.0	0.0
Riboflavin, mg.	160.0	0.0
Fortafeed, gm.[5]	0.0	30.0

[1] Unit of measure is pound(s) unless otherwise specified.
[2] Defluorophos (International Mineral and Chemical Corp.) = 31.5 per cent Ca. and 13.1 per cent P.
[3] Delsterol (Du Pont) = 2000 A.O.A.C. units of D per gram.
[4] Feedgrade choline chloride (Lederle) = 217 mg. choline per gram.
[5] Fortafeed (Lederle) = guaranteed minimum concentration of 4,000 micrograms each of riboflavin, calcium pantothenate and niacin plus 22,000 micrograms of choline chloride per gram.

gallon of drinking water, 21.0 per cent died in the comparable lot tested in trial 2. Although mortality increased progressively in both trials as the concentration of salt was raised above 200 grains, mortality in trial 2 was much greater at each concentration of salt than in the comparable lots from trial 1. Because salt is hygroscopic, some variation in mortality between lots fed the same concentration of salt may be attributed to the variation in moisture weighed as "salt." This, however, could have been responsible for only a small share of the variation in results obtained between trials 1 and 2. As may be seen in Table 2, concentrations of salt above 200 grains per gallon resulted in a marked increase in mortality. It was surprising to find that some chicks survived concentrations of salt water up to 550 grains and grew reasonably well to 6 weeks of age.

Many chicks became edematous by 7 days of age. Their bodies in the regions of the abdomen and upper and lower thighs appeared puffy. Among them were those whose respiration was labored as evidenced by their extended necks and their breathing in gasp-like fashion. As may be seen in Table 3, this bloated condition was reflected in higher body weights at 1 week of age.

TABLE II

Percentage mortality among lots fed graded concentrations of brackish water from day-old to 6 weeks of age.

Trial	No. of chicks per lot	Grains of salt per gallon of drinking water										
		0	100	150	200	250	300	350	400	450	500	550
1	19	5.3	0.0	10.6	5.3	10.6	26.3	47.4	—	—	—	—
2	19	5.3	10.6	0.0	21.0	21.0	63.2	89.5	—	—	—	—
3	20	5.0	—	—	—	—	—	15.0	30.0	75.0	75.0	85.0

TABLE III

Average body weight of chicks at 6 weeks of age[1]

Trial 1			Trial 2			Trial 3		
Grains salt per gallon	Mean body weight at 7 days	Mean body weight at 42 days	Grains salt per gallon	Mean body weight at 7 days	Mean body weight at 42 days	Grains salt per gallon	Mean body weight at 7 days	Mean body weight at 42 days
	gms.	gms.		gms.	gms.		gms.	gms.
0	78	664	0	69	626	0	70	651
100	76	639	100	71	628	350	77	702
150	73	633	150	68	607	400	84	672
200	79	710	200	72	615	450	86	635
250	79	636	250	80	620	500	83	670
300	74	685	300	82	518	550	84	584
350	87	621	350	87	526	—	—	—

[1] Average weights based on unselected, straightrun chicks.

There was no real effect of salt concentrations to 250 grains on body weight of survivors. No retardation in growth was observed to 350 grains in trial 1, whereas a definite depression occurred at 300 grains in trial 2. No depression in the growth of survivors was noted in trial 3 up to 500 grains.

In general, water consumption increased as the salt concentration of the drinking water was raised. The data collected on this phenomenon are summarized in Table 4.

TABLE IV

Average water consumption to 6 weeks of age of lots fed graded concentrations of brackish water[1]

Grains salt per gallon	Trials		
	1	2	3
0	741	681	812
100	799	704	
150	842	765	
200	1,001	782	
250	1,021	1,026	
300	1,279	952	
350	1,333	1,532	1,386
400			1,329
450			1,515
500			2,567
550			2,094

[1] Quantities of water expressed in cc.

When the average biweekly feed consumption of the lots tested in trials 2 and 3 were analyzed by the covariance method, no real effect of salt concentration was found on feed consumption.

Six-week-old cockerels

The cockerels tested in trials 4 and 5 were able to tolerate salt in their drinking water in concentrations up to 400 grains per gallon, the uppermost limit of this study, without any mortality. An analysis of variance based on individual gains of the cockerels tested in both trials showed no significant effect of salt concentrations on growth rate. The cockerels receiving the highest concentration of salt were heavier than their respective controls in both trials. However, there was a real difference in gains between the two trials ($P<0.05$). These data are shown in Table 5. Nor was there

TABLE V

Average gain in grams of cockerels fed graded concentrations of Hawaiian salt in drinking water from 6 to 12 weeks of age.

Trial	No. of cockerels per lot	Salt concentration expressed in grains per gallon				
		4.4	100.0	200.0	300.0	400.0
1	15	1164.2	1198.3	1155.8	1152.8	1250.6
2	15	1209.6	1241.6	1196.5	1257.3	1284.2

any significant effect of salt concentrations on feed consumption, this conclusion being based on a covariance analysis of the feed consumption data from trial 5 only. As in the chick trials, there was a significant increase in brackish-water consumption with increasing concentrations of salt.

Seven-week-old pullets

The pullets tested in trial 6 also tolerated brackish water in concentrations up to 400 grains from 7 to 27 weeks of age. Analyses of variance based on individual gains from 6 to 13 weeks of age and from 13 to 19 weeks of age showed no significant effect of treatment on growth. There was, however, a real difference in body-weight increase among the four lots during the interval from 19 to 25 weeks of age ($P<0.05$). As may be seen in Table 6, the three lots fed brackish water grew faster than the controls. By 25 weeks of age, the controls had

TABLE VI

Average gains of pullets fed graded concentrations of salt water (grams)

Age of pullets	No. of pullets per lot at start	Salt concentration expressed in grains per gallon			
		4.4	200.0	300.0	400.0
7 to 13 weeks	20	803.2	781.2	785.1	782.7
13 to 19 weeks		558.2	548.8	552.8	537.0
19 to 25 weeks		377.7	496.5	528.4	513.1
Total gain		1739.1	1826.5	1866.3	1832.8

made an average gain of 1739.1 grams, whereas those fed 200, 300, and 400 grains of salt per gallon of drinking water gained 1826.5, 1866.3, and 1832.8 grams, respectively. When the feed consumption data were analyzed by the covariance method, no real effect of salt concentration on feed consumption was found.

As in the previous studies, water consumption rose as the concentration of salt was increased ($P<0.01$). This was most apparent at the time the pullets matured. In Figure 1 is shown the weekly water consumption of the four lots. As may be seen, the rate at which water intake rose in the lots fed 300 and 400 grains of salt, following sexual maturity, was greater than that of the controls.

The control pullets matured earlier than the lots fed brackish water. However, there was no real difference in rate of lay by the time the pullets reached 27 weeks of age. At that time the hen-day production of the lots fed 4.4, 200.0, 300.0, and 400.0 grains of salt per gallon of water was 61.3, 66.4, 66.9, and 69.2 per cent, respectively. These data are shown in Table 7. In spite of the high salt content, the pullets fed 400.0 grains of salt grew faster, suffered less mortality, and were laying better than the controls at the end of this study.

Livability among the pullets was not adversely affected by concentrations of salt in drinking water up to 400 grains.

TABLE VII

Percentage hen-day production of pullets fed graded concentrations of salt water

Grains of salt per gallon of water	Weeks of age						
	21	22	23	24	25	26	27
4.4	4.5	12.8	22.8	32.5	36.1	49.6	61.3
200.0	0.0	0.0	1.4	10.0	25.0	57.1	66.4
300.0	0.0	2.8	6.4	24.3	38.6	63.4	66.9
400.0	0.0	2.1	5.7	25.7	48.6	61.3	69.2

During this 20-week study, mortality due to all causes among the lots fed 4.4, 200.0, 300.0, and 400.0 grains of salt per gallon of drinking water was 15, 0, 5, and 5 per cent, respectively.

DISCUSSION AND CONCLUSIONS

These studies have shown that the tolerance of New Hampshire chickens to salt solutions of various concentrations is influenced by age. Day-old chicks grew normally on levels of brackish water up to 150 grains of salt per gallon of drinking water, and 15 per cent of the chicks tested in trial 3 survived to 6 weeks of age when fed 550 grains. Cockerels 6 weeks of age were able to grow normally on concentrations up to 400 grains, the upper limit tested in trials 4 and 5. Similarly, 7-week-old pullets grew normally on 400-grain water to 27 weeks of age. In this study, at least, cockerels and pullets receiving this concentration of brackish water were heavier than their controls at the termination of their respective trials.

The consumption of water increased in all trials as the

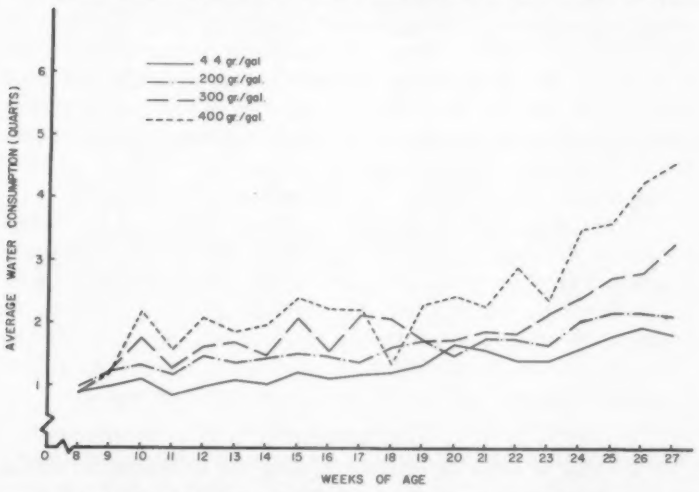

Fig. 1 Average weekly water consumption of pullets fed graded concentrations of salt.

concentration of salt was raised. This phenomenon was particularly evident in trial 6 when the pullets attained sexual maturity. As shown in figure 1, the rate of increase in water intake rose directly with the concentration of salt added to the water. It should be noted, too, that the feces appeared to be more moist among chicks on the higher levels of salt. These observations suggest rather than clarify an interesting physiological interrelationship between salt concentrations in the drinking water and osmotic pressures of the lumen, blood stream, and other tissues of the body, and their contributing effects on thirst.

Salt in drinking water appears to be toxic to chickens at comparatively lower levels than that tolerated in dry feed. The lower mortality rate of quail chicks given 2 to 8 per cent salt in their rations (Nestler, 1943) as compared with total mortality among chicks given 0.9 to 2.0 per cent salt solutions (Blaxland, 1946) and the report by Heller (1933) that laying birds will not tolerate more than 1.5 per cent salt in their drinking water indicate that salt in solution has a more toxic effect than equivalent concentrations of salt in feed. In this study, for example, chicks receiving 200 grains of salt in trial 2 became puffy by the seventh day and 21 per cent died by the fourteenth day. It was calculated that the mean salt consumption of this lot in both water and mash was approximately 1.83 per cent of total dry feed during the first 7 days and 1.28 per cent during the second 7 days. In this trial, also, 89.5 per cent of the chicks died during the first 14 days when fed a salt solution containing 350 grains of Hawaiian salt; and it was calculated that these chicks consumed salt at the rate of 3.44 per cent of dry feed during the first 7 days and 2.80 per cent salt during the second 7 days. When fed in dry form, a concentration of 4.18 per cent was lethal to young chicks according to Kare and Biely (1948), whereas Barlow *et al.* (1948) found that 3 per cent salt was the minimum toxic level.

From these data it is concluded that chicks can be reared safely on salt solutions containing up to 150 grains of Hawaiian salt. The data show, also, that areas containing up to 400-grain brackish water may be suitable for the rearing of chickens older than 6 weeks of age. It is not known, however, whether this recommendation is valid when the concentration of magnesium as well as of sodium chloride is high.

SUMMARY

1. Age is a factor in determining the tolerance of chicks to salt solutions.

2. Day-old chicks apparently were unaffected by concentrations of Hawaiian salt up to 150 grains per gallon. It was found that 15 per cent survived to 6 weeks of age when given salt water containing 550 grains of salt.

3. Six-week-old cockerels and seven-week-old pullets grew as well as their controls on concentrations of salt up to 400 grains, the upper limit tested.

4. This study confirms other reports that salt in solution is toxic at lower concentrations than salt added to dry feed.

ACKNOWLEDGMENT

The authors are indebted to Mr. Giichi Fujimoto, Assistant Chemist in the Hawaii Agricultural Experiment Station, for the chemical analysis of the Hawaiian salt used in this study.

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EXPORTS OF U.S. BABY CHICKS AND EGGS TO MEXICO ARE UP

United States for the first 4 months of 1954 exported over 2 million baby chicks to Mexico compared to 1.1 million for the same period last year. Thus our baby chick exports for these 4 months average a half million per month. If this continues our exports to Mexico for 1954 should be well above 5 million baby chicks compared to 2.8 million in 1953.

Fresh eggs (in the shell) exports also were up for the first 4 months of 1954, amounting to 4.2 million dozen compared with 3.6 million dozen for the same period in 1953. (Foreign Crops and Markets, U.S.D.A.)

EXPERIMENT ON PALATABILITY OF GRAINS

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It has always been observed, that all feedstuffs, even if they have the same nutritive value, do not have the same palatability for chickens. It has however always been a question of discussion which feedstuffs are palatable and which are not. In fact it seems that at this moment no one seems to be certain whether chickens have a sense of smell or of taste at all: This seems to suggest that palatability must have something to do with the chicken's sense of touch, memory or sight. If sight plays an important part, it would be interesting to know if chickens are color blind or if they can distinguish colors and which. With a view of getting some data on the subject the following experiment was started.

Set-up of the experiment: 240 pullets were housed in individual cages at the age of about 5 months; the pullets were of different breeds and crosses. They were given battery pellets and battery mash ad. lib., plus 50 grams of grain per day. The grain mixture was as follows:

35 parts by weight of yellow corn
35 parts by weight of wheat
10 parts by weight of barley
10 parts by weight of white dari sorghum
7½ parts by weight of buckwheat
2½ parts by weight of black sunflower seed.

The birds were kept in cages during the 8 months of the experiment; the birds that died or had to be culled were replaced. At the end of the sixth month the grains that were left over after 23 hours were checked regularly; no birds were replaced during these last two months. Table I shows the average reaction to feed of the 237 survivors. Production during these two months was at 65%.

Results and discussion: The most striking result of this experiment is the rather amazing variety of "tastes." Out of 237 birds, not less than 30 different well defined different ideas about palatability were noted. Only 65 hens ate everything, but it must be pointed out that only negative results have been recorded, that is, the feedstuffs that were definitely not liked or not eaten at all. Futhermore these 65 individuals did not eat their grains in the same order, some prefered the corn first, others the wheat and so on. In fact there were no

TABLE I—FEED PREFERENCES OF PULLETS

Ate everything	65
Did not like mash	37
Refused mash	12
Did not like sunflower seeds	13
Refused sunflower seeds	5
Did not like pellets	10
Refused pellets	8
Did not like oyster shell	11
Refused oyster shell	6
Did not like corn	12
Refused corn	3
Did not like sorghum	7
Refused sorghum	7
Did not like buckwheat	6
Refused buckwheat	3
Did not like barley	1
Refused barley	3
Did not like grit	1
Refused grit	1
Did not like wheat	2
Ate little or no sunflower seeds or corn	3
Ate little or no sunflower seeds or pellets	1
Ate little or no sunflower seeds or buckwheat	3
Ate little or no sunflower seeds or oyster shell	1
Ate little or no sorghum or oyster shell	1
Ate little or no corn or barley	1
Ate little or no oyster shell or buckwheat	1
Ate little or no oyster shell or corn	1
Ate little or no barley, corn or sunflower seeds	1
Ate little or no barley, corn or wheat	1
Total number of birds	237

"Not liked" means that after 23 hours, more than 1/3 of the feedstuff was left.
"Refused" means that after 23 hours, more than 3/4 of the feedstuff was left.
Repeated checks gave practically the same results for every bird every time, and this over a period of two months.

two birds with the same "taste." These 65 had however, after 23 hours eaten practically everything given to them.

Rather surprizing too, was the palatability of the barley, because this is a grain which has often been reported as not being liked. Sunflower seeds to the contrary did not meet with much enthusiasm in some quarters, although some birds seem to relish them. The only rather conclusive result was in favor of the wheat but even here there were some exceptions.

All this seems to point to the fact, that the old custom of carefully mixing the scratch grains for laying birds is based on the false belief, that birds as a whole like certain grains and dislike others. When scratch grains are thrown before a flock of birds some of them gorge themselves with the grain they prefer while others gobble up something else; what one does not like is eaten by the other. When everything has disappeared, the farmer thinks the birds have eaten the mixed

grains in the proportion as he mixed them; in realty nearly all the birds have had a very one-sided meal.

Conclusion: The experiment seems to suggest that laying birds have very individual ideas about palatability, so that there may be a definite advantage in giving them an all-mash diet. No conclusion could be drawn as to why some birds prefer some grains to others.

EARLY EMBRYOS IN TURKEY EGGS MAKE MOST AND BEST POULTS

Fertility in turkey eggs can be determined more accurately by candling the eggs individually after 24 hours of incubation and again after 32 hours than by the usual practice of candling after longer periods.

Agricultural Research Service poultry researchers M. W. Olsen and S. J. Marsden reached this conclusion after incubation tests on some 4,000 Beltsville Small White eggs. It was Olsen and Marsden who discovered parthenogenesis in turkey eggs (Agr. Res., Aug. 1953).

Results indicate (1) the largest number and best poults come from eggs that show fertility within 24 hours of incubation; (2) true fertility, for practical purposes, shows up by 72 hours; and (3) eggs showing embryonic development beginning after 72 hours are largely parthenogenic and don't produce poults.

Thus, there appears to be substantial error in the results obtained by breeders and research workers in testing for turkey-egg fertility after a week or more of incubation.

Olsen and Marsden point out that many eggs that look fertile when candled after 7 days of incubation are probably not truly fertile. Mere presence of an embryo and blood, found by candling or breaking out, doesn't necessarily indicate true fertility. This was apparent from the tests; about 5 percent of the parthenogenic eggs had blood formation and 2 percent developed true embryos.

The tests also cleared up another point. Hatcheryman follow the practice of "table candling" turkey eggs after about 24 days of incubation and paying for the eggs on the basis of "fertility" at that time. Olsen and Marsden's work proves that this is an effective and practical method of eliminating all non-fertile eggs, including the parthogenic type. ("Agricultural Research," U.S. Department of Agr., Washington, D.C.)

INCREASING FERTILITY AND DECREASING BROODINESS IN TURKEYS

Further cooperative work at Pullman, Wash., confirms earlier results indicating the beneficial effects of "heat preconditioning" (at 50° F. for 5 weeks) on fertility of turkey toms. Benefits appear to be less when the birds are subjected to relatively mild winters. By selection it has been possible to develop lines of turkeys differing as much as 44 days in age at which males reached sexual maturity. Semen production in turkey males virtually stopped in periods of extreme winter and summer temperatures. Strain crossing in turkeys was stimulating to growth up to 6 weeks of age, but the improvement was lost by the time the turkeys reached market age. The only marked improvement of strain-cross turkeys over purebreds was in that they reached satisfactory market condition at an earlier age.

The incidence of broodiness in Beltsville Small White turkeys was reduced from 81 and 86 percent in 1944 and 1945, respectively, to 25 percent in 1951 by selective breeding for nonbroodiness. Broodiness interfered with egg production to such an extent that nonbroody turkeys produced an average of 22.3 more eggs annually than hens that were broody once, and approximately 39.5 more eggs than hens broody more than once. (Report of the Chief of the Bureau of Animal Industry (1953), U. S. Department of Agriculture, Washington, D. C.

AUSTRALIAN POULTRY EFFICIENCY CONFERENCE

The Australian egg industry is experiencing severe difficulties on account of the low egg prices realized at the English market which took 37% of Australia's commercial egg production in 1953-54. There were indications that the efficiency of the Australian poultry industry was lower than in some oversea countries where poultry improvement plans have been implemented in recent years. The Agricultural Council agreed therefore that a special conference of poultry officers from the Commonwealth and all States be called to examine closely all possibilities for obtaining a reduction in the costs of production in the poultry industry in Australia.

This conference took place in Perth, W/A, from 8th-12th November. Recommendations were formulated after an intensive discussion of all related problems and submitted to the Agricultural Council for its next meeting in December. It is anticipated that amongst other matters a special Committee will be set up to draft a National Poultry Improvement Plan conneced with random sample testing.

VICIOUS HABITS AND CANNIBALISM

WILLIAM C. SANCTUARY
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Negatively speaking, there is apparently little or no relation between cannibalism and bossism.

Cannibalism may start with baby chicks picking at one another's toenails. A little later, having acquired a taste for blood, the same inquisitiveness may lead to feather picking. This may continue unnoticed on the range only to reappear in the relatively crowded condition of the laying pens. Adult feather picking is very common in Barred Rocks. One year at the University, the Barred Rock pullets were as denuded in midwinter as they usually are in midsummer. Strangely enough, there was no discernible drop in egg production and no cannibalsim associated with this outbreak.

Males may become victims of feather pulling in the saddle region and from picking at scabs about the combs and wattles. The hens are responsible for this trouble. Vent cannibalism usually causes the most severe losses. Abnormal eversion of the oviduct and some bleeding in the laying of first eggs attract the attention of some nearby, alert pullet. Later, some will have learned to continue picking at the vent, even when it is closed. This form of cannibalism has been associated with rations having a considerable amount of corn in them. With the wide adoption of high energy rations, cannibalism has again been on the increase. The vicious habit has also been associated with certain strains of birds.

Perhaps the most vicious type of cannibalism the writer has ever seen was at the Experiment Station the winter he was taking humidity and other readings three times a day all winter long. In one breeding pen most of the females were seen to spend most of the time on the roosts for some inexplicable reason. Upon examination it was discovered that every female but one had scabby or badly injured vents. Continued observation of this pen was rewarded when a male was about to tread a hen that had dared come off the roost. The hitherto unrecognized cannibal (the one bird with a normal vent) dashed in and picked several times at the now open vent of the victim. Further observations in the adjoining pen indicated how this cannibal probably learned her trade. In that pen two birds were frequently seen apparently picking up droplets of semen in the litter, following matings.

Numerous methods may be employed to curb or prevent cannibalism. In the first place, the victims tend to be grouped in certain families. Mount Hope found this to be true. It was true of the University Barred Rocks. Upon eliminating the few families in which the victims were found, cannibalism has practically disappeared. Scratch and mash has always been fed to these birds.

Life is being made easier by the year for our birds. Idle hands will find mischief to do. Perhaps insufficient exercise is partly responsible for increasing mortality, even though not proven to affect egg production. A pail of scratch in each pen scattered three to five times a day has been very effective in curbing vent cannibalism. This also made the hen stir the litter. Pick-guards and debeaking may be employed. Both of these methods cause some trouble at the water founts but are effective in curbing the cannibalism. (Featheredfax)

F.A.O.—TECHNICAL MEETING ON POULTRY PRODUCTION IN ASIA AND THE FAR EAST

The Director-General of F.A.O. has invited the Governments of 17 countries in Asia, the Far East and the Pacific to be represented at the technical level at a regional meeting, to be held in Lucknow, India, from 19th to 28th January, 1955, to consider and determine the best methods of poultry breeding and feeding under different climatic and other conditions and to co-ordinate research work thereon.

The Agenda includes the following main subjects:

Improving Poultry Production through technical planning, cheaper housing, improved equipment and better management.

Improving Poultry Production through Breeding

Improving Poultry Production through Feeding

Prevention of Losses

Improving Institutions, Services and Marketing

The submission of working papers have been invited from Prof. F. M. Fronda from the Philippines to introduce the subject: "Improving Poultry Production through Feeding," and from Mr. F. Skaller from Australia to introduce the subject: "Improving Poultry Production through Breeding."

VACCINATION FOR LARYNGOTRACHEITIS

G. H. SNOEYENBOS

Department of Veterinary Science
University of Massachusetts, Amherst, Mass., U.S.A.

There can be no doubt that laryngotracheitis vaccination produces an excellent immunity. Vaccination has been a major factor in reducing the incidence of the disease from one of the most troublesome to one of the lesser important diseases in this State. These very facts have tended to make vaccination unnecessary and at times probably undesirable.

During the last ten years laryngotracheitis has been important only on a community basis. Infection resulting from ignoring basic sanitary practices has resulted in several severe community outbreaks. The disease is still a threat that should not be ignored.

Although proof is not available, there are good reasons to suspect that vaccination in itself is an important means of perpetuating the disease or actually initiating flock infections by indirect means. The vaccine is fully virulent and is capable of producing a natural form of the disease if it is carelessly handled.

With these considerations in mind the Veterinary Department has not advised vaccination except in the face of an outbreak or in the immediate vicinity of known infections. The threat of the disease has not been considered widespread enough to warrant use of the vaccine except under special circumstances.

Careful application of sound practices of sanitation reduces the chance of infection to a minimum. Laryngotracheitis should be suspected in any flock suffering from a sudden severe respiratory disease with early mortality, or any respiratory disease producing blood in the trachea. In cases such as this, both live and dead birds should be brought immediately to a diagnostic laboratory for examination. Diagnosed infections are reported to the county agents concerned. This allows limited circulation of the fact so that extra precautionary steps can be taken by poultrymen in the area involved. (Featheredfax)

WORLD'S POULTRY SCIENCE LIBRARY

Reviewer:
W. D. TERMOHLEN

United States Department of Agriculture
Washington, D.C., U.S.A.

Poultry Husbandry—Laboratory Exercises for Farm Poultry Production 1954—Thomas B. Avery and Loyal F. Payne, Department of Poultry Husbandry, Kansas State College, Manhattan, Kansas—Second Printing—Burgess Publishing Company, Minneapolis, Minnesota—90 pages—$1.75.

This is a manual, the stated object of which is, to offer a means by which students can obtain a permanent record of the various phases of the poultry industry as demonstrated and studied in the laboratory class. The primary use of this manual would be in connection with a general poultry course. The table of contents lists 15 lessons of which 12 cover production phases and 3 relate to marketing. Three lessons on production culling based on past performance are especially good. Probably the best short description of this manual is that it is a poultry course in a capsule. Especially useful to teachers and students, it can be utilized to an advantage in training people doing poultry service work for feed companies, hatcheries, marketing firms and similar businesses.

It also has a use as a refresher course or reminder to those who wish to review their knowledge of poultry husbandry.

An Outline of the Infectious Diseases of Poultry—1954—Frank H. Manley, Professor, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Alabama—Burgess Publishing Company, Minneapolis, Minnesota—83 pages—$2.25.

The author states in the introduction that the material covered by this outline is confined to the more important infectious diseases of poultry, and that much detail and the less important infectious diseases are not included. "It's raison d'etre lies in the fact that collective information relative to the infectious diseases of poultry is not readily available in concise form." Its conciseness is evidenced by the fact that 29 diseases are covered in 83 pages with some space left on many pages so that notes can be added as required by the reader as new information comes to light. The diseases listed are covered in four sections namely, (1) fifteen bacterial diseases, (2) ten viral diseases, (3) three diseases caused by fungi, and (4) one of undetermined etiology.

Almost half of the book (40 pages) is devoted to 5 diseases, namely Avian Leukosis Complex, Newcastle Disease,

Infectious Bronchitis, Avian Encephalomyelitis and Pullorum Disease. While no specific and exact outline is followed for each disease in general, the following phases are covered: Definition, History, Occurrence or Distribution, Etiology, Transmission, Symptoms, Course, Lesions, Diagnosis, Prevention and Control or Control and Treatment.

Lists of references are not included.

The author points out that the outline will be of help to those wishing to obtain the essential facts concerning a disease without the necessity of consulting text books or works of reference. This is a useful manual for students taking a course in poultry diseases. It can be most helpful to persons engaged in servicing producers. It could well be in the hands of all veterinarians who work in any way with poutlry.

The Bacteriology of Commercial Poultry Processing—1954—M. F. Gunderson, H. W. McFadden, T. S. Kyle, all of the Department of Pathology and Bacteriology, College of Medicine, University of Nebraska, Omaha, Nebraska—Burgess Publishing Co., Minneapolis, Minnesota.

This is a report of research work done under a contract with the U. S. Department of Agriculture and authorized by the Research and Marketing Act of 1946. It is an excellent and well written report of 98 pages and has a place in the library of persons actually engaged in poultry processing, regulatory activities, marketing research workers and will be useful to those teaching poultry marketing courses. The eight chapters of text, with the eight figures and 34 tables, are filled with interesting and helpful information. This can be expected when one considers that the senior author, Dr. Gunderson, has had many years of experience in carrying on research in poultry processing plants. Poultry processing plant activities relating to sanitary control aspects studied and considered are (1) dressed, eviscerated, and cut-up poultry, (2) packaging, processing, chilling and freezing of poultry and compounded foods, (3) cooking, boning, and handling of raw and cooked poultry meat, (4) compounding of foods in which poultry meat is an ingredient and (5) remedial measures needed to eliminate insanitary practices.

It is pointed out that both in dressing and eviscerating the washing procedure, when properly done, results in the removal of dirt, debris, and a sizable portion of the surface bacterial load. The authors express their opinion that eviscerating the birds while still warm offers many advantages, particularly as concerns over-all sanitary practices. The need for ample and suitable hand-washing facilities and their frequent

use; utilization of in-plant chlorination, avoiding the pooling of many birds in common receptacles, and thorough plant clean-up, are pointed out as factors to watch based on research results reported. The role of plant equipment in the reduction of, or addition to the bacterial load on commercially dressed poultry, is discussed. In addition to much original work, there are 75 references cited.

Nutzbringende Geflügel—Wirtschaft (Practical Poultry Management)—1953—Richard R. Römer. Published by Verlag Eugen Ulmer, Stuttgart/zZ Ludwigsburg, West Germany—price DM 17.80.

This book is printed in German. It is a text book and manual from the practical and theoretical point of view for the beginner and advanced student. The length is 677 pages and there are some 252 illustrations. Toward the end of the book there are listed 241 references. The author, Professor Römer is the Director of Instruction and Experimental Work at Poultry Husbandry Hall, Cröllwitz and Director of Central Research for Animal Husbandry, Dummerstorf. The volume makes use of information accumulated in the literature of Germany and abroad, but also includes a decade of laudable practical experience of a sound nature. It is said to be a storehouse of facts for those who wish to teach themselves the significant developments which recent years have brought in the field of raising and keeping poultry. In addition to the raising and keeping of chickens, due consideration is given to turkeys, guineas, geese, ducks and pigeons. All phases of production, including poultry house construction, feeding, breeding, parasites and diseases, accounting, questions pertaining to profits and marketing, are covered in the book. A detailed table of contents makes this book a ready reference. The book is said to be well written and liberally spread with humorous marginal comments. The book will be useful to those who understand and read German but have little or no knowledge of English. For advanced students who need have at least a reading knowledge of German the book will be especially useful.

(Assistance of John A. Hamann, Poultry Division, Agricultural Marketing Service, U. S. Department of Agriculture in translating summary reviews of the book is gratefully acknowledged).

Microscopic Anatomy of the Digestive System of the Chicken—1954—M. Lois Calhoun, School of Veterinary Medicine, Michigan State College, East Lansing, Michigan.—The Iowa State Press, Ames, Iowa. Price $2.50—108 pages.

The objective of this book is best described in the author's own language. "A study of the microscopic anatomy of the entire digestive tract of the chicken (Gallus domesticus) at

different ages has never been undertaken. The author has never seen a related work illustrated with photomicrographs. These features added to the large compilation of literature included herein should make this a valuable source of reference to the anatomist. It should be of added value to the English-speaking anatomist since previous to this time the more complete works were written in the German language.

"This study was also considered with the idea that it would help solve a problem which has long confronted the pathologist. Since he is concerned with the effects of disease on organs, it is hoped that this paper will give him a standard for comparison."

A general review of the literature broken down into 17 parts of the digestive system and covering 20 pages is first presented. Next is a description of the gross anatomy of the digestive system covering 8 pages with an excellent picture of the entire digestive tract of a baby chick. Materials and methods are briefly described on less than one page. Observations were made on the digestive tract from the beak to the anus, including all appendages and reported on 56 pages. No differences were found to exist in the digestive tract of either sex, so the matter of sex was not referred to in the results. A discussion covering 6 pages indicates where the author found agreement or disagreement with other workers. A summary, just over one page in length, briefly summarizes the results of observations. Literature cited covers 164 references. In addition, 161 citations, not included in the review of the literature, are listed as an appendix to the list of reviewed literature.

This book is of primary interest to the anatomist.

Turkey Diseases—1953—James E. Prier, Assistant Professor of Bacteriology, College of Medicine, State University of New York, Syracuse, New York, and formerly Head of Veterinary Science and Bacteriology Department, University of Wyoming, Laramie, Wyoming. —Interstate Printers and Publishers, Danville, Illinois—151 pages —$2.50.

Dr. Prier has done extensive research work in poultry diseases in the laboratory and the field. The author considers this book as a handbook outlining and describing the major turkey diseases, and wherever possible, listing methods for control and prevention of these diseases. He planned the information to be useful to both the grower and the student. At the end of each of the eight chapters he has listed references for the use of those who wish to delve deeper than the basic essentials. A total of 292 references are listed. Dr. Prier

mentions that many turkey growers contributed to this book through their bitter experiences which served as an impetus for many of the trials and experiments reported.

The first chapter covers sanitation and disease prevention. The author expresses the belief that it is wiser and more economical to take every precaution to assure that diseases will not appear and that sanitation is the keynote to a successful disease prevention program. Sanitation must be considered both in a general way and also in great detail, for example; a small amount of manure on a boot may be as important as an uncleaned brooder house. Proper cleaning and sanitation methods are recommended.

Chapters 2 through 7 cover some 39 specific diseases or types classed as nutritional; respiratory; digestive; septicemia; skin, joints, and blood; and miscellaneous.

Chapter 8 covers breeding problems particularly sterility and injuries. There is also quite a good statement regarding artificial insemination.

The desirable practice of listing references at the end of each chapter is followed by the author. That the literature on the subject has been very thoroughly studied is evidenced by the fact that 292 references are cited.

The book is written in an easily read, non-technical manner. The information presented is concise, but basic. It is a recommended book for those interested in turkey production.

WANTED

Inquiries for the proceedings of the following previous World's Poultry Congresses have been received: Holland (1921), Spain (1924), Italy (1933) and U.S.A. (1939). If any person has any of these Proceedings and would care to dispose of them please notify Dr. G. F. Heuser, Rice Hall, Ithaca, N. Y., U.S.A.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne,

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GENETICS

BLYTH, J. S. S. (Poultry Res. Centre, Edinburgh), and **R. W. HALE.** (Agric. Res. Inst., Hillsborough, N. Ireland.)

UNILATERAL DEFECTIVE FEATHERING IN A PUREBRED PULLET. *Jour. Heredity 44:* 181-183. Illus. 1953.—In a purebred White Wyandotte pullet the feathering on the left half of the body lacked barbules and barbs to a varying extent; the scales on the left shank were also defective. The condition was most marked in the remiges, rectrices, and on the lower breast. It resembles the hereditary plumage defect, sunsuit, which is due to a single autosomal recessive.—*J. S. S. Blyth.* (Biological Abstracts)

JAAP, R. GEORGE (Ohio State U., Columbus), and **WILLARD F. HOLLANDER.**

WILD TYPE AS STANDARD IN POULTRY GENETICS. *Poultry Sci. 33:* 94-100. Illus. 1954.—The analytical approach whereby wild type serves as a standard of reference and all genotypes are expressed as deviations from it, is recommended for poultry genetics and teaching. Improvement toward simplicity and accuracy made possible by this approach is described for plumage color and pattern in the domestic fowl, turkey, duck, goose and pigeon. A few examples are given where inconsistencies and inaccuracies have arisen as a result of the failure to adopt such a standard of reference for published reports and textbooks. Two figures are presented to illustrate coloration deviations from a wild-type standard in the domestic fowl and pigeon.—*R. G. Jaap.* (Biological Abstracts)

KING, STEVEN C. and C. R. HENDERSON. (Cornell U., Ithaca, N.Y.)

VARIANCE COMPONENTS ANALYSIS IN HERITABILITY STUDIES. *Poultry Sci. 33:* 147-154. 1954.—Estimation of the heritability of various production traits from poultry data is usually well adapted to the use of the variance components procedure. Since the statistical procedure may be difficult for those unfamiliar with the method, the genetic basis for the use of the variance component method is discussed and the detailed proof of the expected value of the various sums of squares needed is presented. An example is used to show how the computational procedure is handled.—*S. C. King.* (Biological Abstracts)

KING, STEVEN C., and C. R. HENDERSON. (Cornell U., Ithaca, N.Y.)

HERITABILITY STUDIES OF EGG PRODUCTION IN THE DOMESTIC FOWL. *Poultry Sci. 33:* 155-169. 1954.—Data for the estimation of the heritability of egg production traits were taken from a commercial flock of White Leghorns with 8748 trapnested progeny sired by 84 males mated to 796 dams. Principal method of estimating heritability was by variance components analysis, the linear model being a nested classification with full sib progeny within dams within sires within date of hatch. Heritability of age at 1st egg was estimated to be

0.522; March egg wt. 0.475; production index to January 1 was 0.341, to March 1 was 0.303, to June 1 was 0.255 and annual was 0.195; survivors' egg production to January 1 was 0.480, to March 1 was 0.464, to June 1 was 0.392 and annual was 0.312. With the exception of March egg wt., these estimates are all a great deal higher than those given in the literature. Evidence cited indicated that proper accounting for the hatch date effect materially raises heritability estimates. Greater genetic progress could be realized by properly adjusting records for the hatch date effect due to the higher heritability of the trait in question and the greater emphasis which can be given to the individual. The estimates of heritability from the dams' component of variance were higher than those from sires' component of variance, and it was shown that this could be due to small maternal effects, to sire dam interactions, or to less genetic variance due to selection of sires. Further work is needed on this phase of the study. Evidence was presented which indicated that heritability of egg production declines during the year. Further work is needed on the reasons for this and the genetic implications.—*S. C. King.* (Biological Abstracts)

MARCHLEWSKI, J. H. (U Kraków, Poland.)

THE GOLDEN PHEASANT HEN CHRYSOLOPHUS PICTUS L. AND THE DOMESTIC COCK GALLUS DOMESTICUS L. HYBRIDS OBTAINED BY MEANS OF ARTIFICIAL INSEMINATION. *Bull. Internatl. Acad. Polonaise Sci. et Lettres Sér. B. 1951(7/10):* 443-449. Illus. 1952.—A single Golden Pheasant hen was inseminated with the sperm of 2 domestic cocks. One of these was a White Leghorn, the other an undeterminable cross breed. Of 9 eggs laid, 2 reached maturity. They were entirely white in color while the structure of the body resembled that of the Golden Pheasant. Shape of feathers was intermediate between those of the domestic fowl and of the Golden Pheasant.—*Auth. abst.* (Biological Abstracts)

MAW, A. J. G. (Pennsylvania State U., State College.)

INHERITED RIBOFLAVIN DEFICIENCY IN CHICKEN EGGS. *Poultry Sci. 33:* 216-217. 1954.—Various workers have reported that when hens are on a ration deficient in riboflavin: (1) The eggs laid are deficient in riboflavin (the white lacking the characteristic greenish-yellow color); (2) the hatchability of the eggs is greatly reduced. Recently several birds have been found in a commercial flock that, in spite of adequate riboflavin, lay eggs that are deficient in riboflavin. Their eggs show no greenish-yellow pigment in the white. Embryos all die about the 14th day of incubation. Injn. of riboflavin into the fertile egg allows the embryo to survive and such eggs have hatched. Evidence has been obtained that this condition in these birds is definitely an inherited inability on the part of the hen to put the riboflavin into the egg.—*A. J. G. Maw.* (Biological Abstracts)

SKALLER, F. (Poultry Res. Cent., Werribee, Victoria, Australia.)

STUDIES ON THE ASSESSMENT OF EGG PRODUCTION IN POULTRY BREEDING INVESTIGATIONS. 1. THE OPTIMAL PERIOD FOR RECORDING FIRST-YEAR EGG PRODUCTION. *Poultry Sci. 33:* 29-35. 1954.—Eight so-called "annual" periods used in recording the egg production of pullets—biological pullet year (period between date of laying of the first and last egg in the first laying season); calendar year (April 1 to March 31 in following year); biological calendar year (365 days from the date of first egg); period from age at first egg to a stated age, namely 500 days, 18 months, and 20 months of age; and standard pullet year (date of laying first egg to March 31 in following year)—were studied critically. The standard pullet year is considered to be optimum. A combination of the 500-day test with the standard pullet year is recommended to facilitate housing problems.—*H. Branion.* (Biological Abstracts)

PHYSIOLOGY

GABUTEN, ADRIANO R., and C. S. SHAFFNER. (U. Maryland, College Park.)

A STUDY OF THE PHYSIOLOGICAL MECHANISMS AFFECTING SPECIFIC GRAVITY OF CHICKEN EGGS. *Poultry Sci. 33:* 47-53. 1954.—Sixty of 100 New Hampshire pullets trapnested for preliminary records on specific gravity, egg production, and egg wt. were divided into comparable groups. Two levels each of thyroxin, thiouracil, diethylstilbestrol, progesterone, testosterone propionate, cortisone, and penicillin were given separately and data were collected on the production, size and specific gravity of eggs laid before, during, and after treatments. In the case of penicillin, additional data on blood Ca level and breaking strength of the eggs were also collected. Results indicated that penicillin, thyroxin, and stilbestrol maintained and slightly increased the specific gravity of the eggs which normally declines during the summer months and as the production year advances. Testosterone propionate at the rate of a 0.2 mg./day/bird and both levels of progesterone and thiouracil depressed specific gravity. Cortisone was without effect. Penicillin, cortisone, and stilbestrol did not affect the pretreatment level of egg production, while progesterone, testosterone, and thiouracil depressed egg production. The Ca level in the blood serum and the shell-breaking strength of the eggs were higher in the penicillin-fed birds than in the controls.—*Auth. summ.* (Biological Abstracts)

GRZYCKI, ST. (U. Lublin, Poland.)

CYTOCHEMICAL INVESTIGATIONS OF THE NUCLEUS AND THE NUCLEOLUS OF THE CELLS IN THE PALATAL GLANDS OF THE DOMESTIC HEN IN VARIOUS PERIODS OF SECRETORY ACTIVITY. *Bull. Internatl. Acad. Polonaise Sci. et Lettres Sér. B. 1951 (7/10):* 451-467. 1952.—Location, structure and size of the Golgi apparatus are a function of the dynamics of the cell. The Golgi field varies constantly and is dependent upon the metabolism of the cell. The early phases of the secretary cycle are accompanied by a distinct pyroninophilia of the Golgi system, with the simultaneous disappearance of the DNA from the nucleus and RNA from the nucleolus. In the last phase, when the cell is filled with vesicles of mature secretion, a deficiency of RNA in cytoplasm also was observed. It is concluded that DNA and RNA contribute to formation of the end product of metabolism, whereas their amt. diminishes. Hyperplasia and hyperactivation of the Golgi apparatus are a response to a deficiency of DNA in the nucleus. The appearance of DNA of the nucleus varies in different phases of activity of the cell.—*H. Szarski.* (Biological Abstracts)

HUTCHINSON, J. C. D., and A. H. SYKES. (A. R. C. Poultry Res. Centre, King's Buildings, Edinburgh.)

PHYSIOLOGICAL ACCLIMATIZATION OF FOWLS TO A HOT HUMID ENVIRONMENT. *Jour. Agric. Sci. 43:* 294-322. 1953.—Study of effect of acclimatization on heat tolerance of fowls in atmospheres of high humidity and temp. showed that the fowl could be maintained in reasonable health and production under these conditions. Slow acclimatization permitted fowl successfully to stand temps. approx. 5° F. higher than fowl not acclimatized. Evaporation loss was also reduced on acclimatization. Severe climate accompanied by high rectal temps. affected the heart rate. The nature of physiol. acclimatization and with its importance in tests of heat tolerance and in the life of a fowl are discussed.—*R. E. Burns.* (Biological Abstracts)

IVEY, W. D., and S. A. EDGAR. (Alabama Polytech. Inst., Auburn.)

THE HISTOGENESIS OF THE ESOPHAGUS AND CROP OF THE CHICKEN, TURKEY, GUINEA FOWL AND PIGEON, WITH SPECIAL REFERENCE TO CILIATED EPITHELIUM. *Anat. Rec. 114:* 189-211. Illus. 1952.—The histogenesis of the esophagus and crop in 4 spp. of birds (chicken, turkey, guinea fowl, and pigeon) is descr.

in detail. Acidophilic material, probably albumen or yolk, is present in the lumen of the esophagus, crop, and trachea, and occasionally in the lungs during the later stages of embyronic development. The epithelium of the esophagus and crop develops through successive stages of simple columnar, pseudostratified in some cases, two-layered cuboidal, stratified cuboidal or columnar and finally stratified squamous. The number of cell layers of the epithelium increases rapidly just before and just after hatching. In the turkey and chicken during late embryonic development, the surface layer contains numerous ciliated cells resembling those in the human fetus. Cilia persist until after hatching in the turkey. Ciliated cells were seen in 1 specimen of guinea fowl but not in the pigeon. Cilia appear earlier in the esophagus than in the trachea. Free erythrocytes are present in the epithelium after hatching in the turkey and guinea fowl. Generally, the lower esophagus matures earlier than the upper esophagus and crop. No differences in development could be ascribed to the altricial condition of the pigeon at hatching. Of the 4 spp., the esophagus of the turkey is the slowest in developing. Considerable variation in the amt. of ciliation and gland formation is noted between regions during development.—*Auth.* (courtesy Wistar Bibl. Serv.).

LIEBELT, ROBERT ARTHUR, and HERBERT L. EASTLICK. (State Coll. Washington, Pullman.)

THE ORGAN-LIKE NATURE OF THE SUBCUTANEOUS FAT BODIES IN THE CHICKEN. *Poultry Sci. 33:* 169-179. 1954.—The subcut. fat bodies were investigated in the chick embryo and adult domestic fowl. The investigation included: (1) a macroscopic study of the subcut. fat bodies of the chick embryo with respect to location, time of appearance, constancy, and relative size and shape; (2) the establishment of a growth curve for a specific lipid-extracted fat body; (3) the time when Sudan III fed to laying hens and deposited in the yolks appears in the fat depots of embryos. There are 16 distinct regions where the subcut. fat bodies of the chick embryo and adult bird occur constantly. The fat depots tend to have a characteristic time of appearance in the embryo. In general, they appear to maintain the same shape and anatomical relationships in the adult as in the embryo. The lipid-extracted fat body of the lateral abdominal region seems to have the same characteristic growth pattern as that of the body, systems, and organs of the chickens. A statistical analysis indicated that the growth and development of the lipid-extracted fat body is independent of its lipid content. The results of this investigation support the concept that avian subcut. fat bodies possess organ-like characteristics.—*Auth summ.* (Biological Abstracts)

LYNCH, JOHN E., and H. J. STAFSETH. (Michigan State Coll., East Lansing.)

ELECTROPHORETIC STUDIES ON THE SERUM PROTEINS OF TURKEYS. I. THE COMPOSITION OF NORMAL TURKEY SERUM. *Poultry Sci. 32:* 1068-1073. Illus. 1953.—Studies are presented on electrophoretic analyses of normal turkey serum. The relative % composition and mobilities of the serum proteins were established for the conditions under which the expt. was conducted. Electrophoretic analyses of normal turkey serum gave the following results with respect to relative proportions of serum protein components: albumin 66.5%, alpha globulin 7.9%, beta globulin 14.4%, and gamma globulin 11.2%. Mobilities of these components were found to be: albumin 5.6, alpha globulin 3.76, beta globulin 2.4, and gamma globulin 1.6.—*H. J. Stafseth.* (Biological Abstracts)

MELLEN, W. J., and F. W. HILL. (Cornell U., Ithaca, N.Y.)

EFFECTS OF THIOURACIL, THYROPROTEIN AND ESTROGEN UPON THE BASAL METABOLISM AND THYROID SIZE OF GROWING CHICKENS. *Poultry Sci. 32:* 994-1001. 1953.—The effects on basal O_2 consumption of feeding dienestrol diacetate (0.005% of the diet), thiouracil (0.1%), and Protamone thyroactive iodinated casein (0.02%) singly and in all possible combinations were studied in a 2^3 factorial expt. with young growing male chickens. The Haldane gravimetric method for determining respiratory exchange was used. Prota-

mone significantly depressed basal O_2 consumption. Because of the profound inhibitory effect of dietary Protamone on the thyroid it is hypothesized that chicks in the fasted state were actually hypothyroid due to the withdrawal of the exogenous source of thyroxine. Protamone had no effect on growth rate. Thiouracil depressed growth and basal O_2 consumption markedly. However, when correction for the influence of body size on basal O_2 consumption was made by covariance analysis, no effect of thiouracil on basal metabolic rate was found. Dienestrol diacetate tended to increase basal O_2 consumption, the effect approaching significance at the 5% level. The estrogen reduced the growth depressing effect of thiouracil when fed in combination with it.—*F. W. Hill.* (Biological Abstracts

STURKIE, PAUL D., and DONALD POLIN. (Rutgers U., New Brunswick,

ROLE OF THE MAGNUM AND UTERUS IN THE DETERMINATION OF ALBUMEN QUALITY OF LAID EGGS. *Poultry Sci. 33:* 9-17. 1954.—Oviducal eggs were removed from the uteri of hens, 2 to 3 hours after such eggs had left the magnum, and the quality of their albumen was compared with that of freshly laid eggs which varied greatly in albumen quality. Based upon differences in height, viscosity and visual scores of albumen of laid and uterine eggs, albumen quality deteriorates after the egg leaves the magnum and enters the uterus. The deterioration is, however, not accompanied by changes in the contents of water or solids. These data also suggest that variation in the amt. of mucin secreted in the magnum may account for some of the changes in albumen quality of laid eggs. The results demonstrate that there is little correlation between the amt. of thick albumen collected by the screening technique and albumen quality as indicated by height, visual score and viscosity of the albumen.—*P. D. Sturkie.* (Biological Abstracts)

STURKIE, PAUL D., H. S. WEISS, and R. K. RINGER. (Rutgers U., New Brunswick, N.J.)

EFFECTS O FINJECTIONS OF ACETYLCHOLINE AND EPHEDRINE UPON COMPONENTS OF THE HEN'S EGG. *Poultry Sci. 33:* 18-24. 1954.—Effects of injns. of acetylcholine and ephedrine in the hen at different stages of egg formation upon certain components of the laid egg were studied. These drugs had no effect upon the wt. of the egg, wt. of the yolk, and vol. of albumen, except for the outer thin albumen, which was decreased in 2 treatments with acetylcholine. They had no effect upon the percent solids or water content of yolk or albumen, based upon refractive index. Injn. of acetylcholine, which causes contraction of the oviduct, tended to decrease the width-length index of the egg, or make the egg longer. Ephedrine, which relaxes oviducal muscles, particularly those of the uterus, increased the width-length index. Acetylcholine and ephedrine, injd. when the egg was in the uterus, decreased the percentage of shell on the egg. Acetylcholine had no effect upon the viscosity of the thick albumen, but it increased the viscosity of the outer thin albumen in most cases, and, in some instances, that of the inner thin. Ephedrine tended to decrease the viscosity of the middle thick, but had no effect on the viscosity of thin albumen.—*P. D. Sturkie.* (Biological Abstracts)

WILSON, P. N. (Wye Coll., U. London.)

GROWTH ANALYSIS OF THE DOMESTIC FOWL. *Jour. Agric. Sci. 44:* 67-85. Illus. 1954.—Chickens were fed on 2 planes of nutrition, and some alternated between the 2 planes. Sample cockerels from each trial were killed and dissected at 0, 4, 10, 15, and 24 wks. of age. There were no treatment differences in the gross proportions of the birds calculated on the basis of wts. of the major joints. There was no consistent age or treatment effect on fat content. Wet and dry wt. of muscle and of the skeleton of birds of the same age varied with treatment. There was no effect on birds of equal wt. Evidence for centripetal growth is presented from both the muscle and skeletal data.—*R. E. Burns.* (Biological Abstracts)

NUTRITION

ALMQUIST, H. J. (The Grange Co., Modesto, Calif.)

APPLICATION OF THE LAW OF DIMINISHING RETURNS TO ESTIMATION OF B-VITAMINS REQUIREMENTS FOR GROWTH. *Poultry Sci. 32:* 1001-1003. 1953.—Method of analysis of vit. requirement data discussed in a previous paper is extended to several examples in the vit. B group.—*H. J. Almquist.* (Biological Abstracts)

ALMQUIST, H. J., and J. B. MERRITT.

ACCENTUATION OF DIETARY AMINO ACID DEFICIENCY BY RAW SOYBEAN GROWTH INHIBITOR. *Proc. Soc. Exptl. Biol. and Med. 84:* 333-334. 1953.—Presence of raw soybean protein in the chick diet was found to develop a deficiency of tryptophane in a diet marginal in this amino acid. A diet deficient or marginal in arginine and methionine was rendered more acutely deficient when the soybean component was present as raw meal. The effects of these induced deficiencies in the diets were reversed by adding the specific amino acids or by heating the raw soybean meal.—*Authors.* (Biological Abstracts)

ALTSCHUL, A. M. (Southern Reg. Res. Lab., New Orleans.)

THE EFFECT OF PROCESSING CONDITIONS ON THE NUTRITIVE VALUE OF COTTONSEED MEAL FOR POULTRY. A REVIEW. *Poultry Sci. 33:* 180-185. 1954.—A comprehensive program of research on the effect of processing conditions on the nutritive value of cottonseed meal is described. Although cottonseed meal has been used extensively as a protein supplement for cattle, its use for nonruminants has been limited. As part of this research program it has been demonstrated that cottonseed meal is a variable nutritional material for poultry depending largely on conditions of processing. Commercial conditions of processing exist which result in production of meals of low free-gossypol content (0.04% or less). Feeding tests conducted by cooperating investigators thus far failed to reveal any interference with growth of poultry when such meals were fed in unrestricted quantities. The lower the temperature of processing, the better is the protein quality of the meal. The objective of the research program is to develop means of producing economically and regularly meals which have high protein quality and which can be fed in unrestricted quantities in the diet.—*A. M. Altschul.* (Biological Abstracts)

AMSCHLER, J. W., and H. PAMMER. (Hochsch. f. Bodenkultur, Vienna.)

KUKENMASTVERSUCH MIT X AUROFAC-2A. [CHICKEN FATTENING WITH A-2A.] *Bodenkultur. Oesterreich Zentralorgan Landwirtsch. u. Ernährungsforsch. 6:* 341-343. 1952.—Chickens fed with A-2A reached their fattening limit (750 g.) 15 days earlier. They used their fodder about 16.5% better and per chicken and month 0.109 kg. could be saved. The mortality was lower in the A-2A group than in the normally fed group. The wt. of all chickens in the 1st group was nearly the same but in the 2nd there were great differences in wt. In both the cases the feathering was the same.—*A. Radermacher.* (Biological Abstracts)

AMSCHLER, J. W., and H. PAMMER. (Hochsch. f. Bogenkultur, Vienna.)

LEGELEISTUNGSTASTVERSUCH MIT OUROFAC-2A. [THE EFFECT OF A-2A ON THE LAYING OF EGGS.] *Bodenkultur, Oesterreich. Zentralorgan Landwirtsch. u. Ernährungsforsch. 6: 344-345.* 1952. —The test is descr. and the results are briefly reported.—*A. Radermachcer.* (Biological Abstracts)

ANDERSON, G. W., J. D. CUNNINGHAM, and S. J. SLINGER. (Ontario Agric. Coll., Guelph, Canada.)

EFFECT OF TERRAMYCIN AND CERTAIN PHENYLARSONIC ACID DERIVATIVES ON THE GROWTH AND INTESTINAL

FLORA OF TURKEY POULTS. *Jour. Nutrition 48:* 539-552. 1952.—Broad Breasted Bronze turkey poults were fed diets containing various phenylarsonic acid derivatives in the absence and presence of Terramycin hydrochloride. Highly significant increases in wt. were obtained by the feeding of Mg 4-hydroxyphenylarsonate and 3-nitro-4-hydroxyphenyl arsonic acid. The wt. increases caused by including 3-amino 4-hydroxyphenyl arsonic acid and 3-acetylamino 4-hydroxyphenyl arsonic acid were not significant. Additions to the basal diet of Terramycin or combinations of the antibiotic and any of the phenylarsonic acid derivatives resulted in highly significant wt. increases. In general, wt. increases were accompanied by slight improvement in feed efficiency. Increases in wt. caused by Terramycin, phenylarsonic acid derivatives or combinations thereof, were accompanied in most cases by a reduction in the pH of the cecal contents. Terramycin, phenylarsonic acid derivatives and combinations of these materials markedly influenced the cecal flora. Effects of the antibiotic and some of the phenylarsonic acid derivatives were similar in many respects. In general, wt. increases were accompanied by increases in the lactobacilli counts of the cecal contents. The numbers of aciduric, proteolytic, coliform and enterococci organisms were not consistently in agreement with wt. increases.—*Auth.* (courtesy Wistar Bibl. Serv.).

ATKINSON, R. L., B. L. REID, J. H. QUISENBERRY, and J. R. COUCH. (Texas Agric. Expt. Sta., College Station.)
ANTIBIOTICS, METHIONINE AND UNIDENTIFIED GROWTH FACTORS IN THE NUTRITION OF BROADBREASTED BRONZE TURKEY POULTS. *Jour. Nutrition 51:* 53-64. 1953.—Five expts. were conducted with Broadbreasted Bronze turkey poults fed an all-vegetable protein diet. Supplements added to the basal diet were bacitracin, penicillin, distillers' dried solubles, DL-methionine and aureomycin. From results it is apparent that bacitracin and penicillin can be used in turkey starting and growing rations. It is indicated that antibiotics do not always induce a growth response when added to turkey diets. An excellent growth response was obtained by supplementing the basal ration with 0.05% methionine. This response was shown to be additive with that due to the unidentified factor in distillers' dried solubles, and was further increased by the addition of an antibiotic to such a ration. Distillers' dried solubles contain an unidentified poult growth factor. The content of such factor in this product varied in different samples obtained from the same manufacturer. No explanation of such variance is apparent from the data presented.—*Auth.* (courtesy Wistar Bibl. Serv.).

BLACK, W. A. P. (Inst. Seaweed Res., Inveresk, Midlothian, Scotland.)
SEAWEED AS A POULTRY FOOD. *World's Poultry Sci. Jour. 10:* 33-35. 1954.—Meals from *Laminaria claustoni* and *Ascophyllum nodosum* contained up to 10% chloride and up to 35% ash; 10% of the laying mashes was associated with heavy water consumption while 15% caused loss in wt. and a more rapid decrease in egg production. Ascophyllum meal adds considerable vitamin A activity and some D and B^{12} activity. It also contributes to egg yolk color.—*J. B. Christiansen.* (Biological Abstracts)

BRANION, H. D., and D. C. HILL. (Ontario Agric. Coll., Guelph, Canada.)
DETERGENTS AND CHICK GROWTH. *Poultry Sci. 33:* 62-66. 1954.—The individual addition of each of 6 synthetic, commercial detergents and 1 soap, at a level of 0.5% of the diet of chicks did not give an increased growth response to 12 weeks of age. Procaine penicillin at 10 p.p.m. in the diet also failed to give a response.—*H. Branion.* (Biological Abstracts)

COMBS, G. F., G. H. ARSCOTT, and H. L. JONES. (U. Maryland, College Park.)
UNIDENTIFIED GROWTH FACTORS REQUIRED BY CHICKS AND POULTS. 3. CHICK STUDIES INVOLVING PRACTICAL-TYPE RATIONS. *Poultry Sci. 33:* 71-79. 1954.—Evidence indicates that 2 unidentified growth factors are required for rapid growth of chicks fed practical-type rations. One of these factors appears to be supplied

by fish meal, crab meal, whale solubles and meat scrap; the other by butyl molasses fermentation solubles, butyl grain fermentation solubles, molasses distillers' dried solubles, dried whey product, and dried brewers' yeast. The data also indicate that the dietary requirement of the chick for these factors is spared by the oral admn. of certain antibiotics. Orotic acid supplementation promoted more rapid growth when added to a practical-type ration containing 3.75% fish meal and 4 p.p.m. of procaine penicillin G, both in the absence and presence of 5% dried whey and/or 0.05% added DL-methionine.—*Authors.* (Biological Abstracts)

COOK, F. D., R. M. BLAKELY, H. I. MacGREGOR, and R. W. ANDERSON. (Dominion Exptl. Sta., Swift Current, Saskatchewan, Canada.)
THE EFFECT OF ANTIBIOTICS ON THE INTESTINAL MICROFLORA OF TURKEY POULTS. *Poultry Sci. 33:* 38-40. 1954.—Day-old turkey poults were fed the Station poult starter mash with and without 9 p.p.m. penicillin. Counts of lactobacilli and coliform bacteria in various sections of the digestive tract indicated the following changes due to penicillin in the diet. Lactobacilli were unchanged in the gizzard and cecum, but markedly reduced in the small and large intestine and duodenal loop. Coliforms were unchanged in the cecum but were 10-1000 fold higher in the small and large intestine.—*R. M. Blakely.* (Biological Abstracts)

DUCKWORTH, JOHN.
RESEARCH IN POULTRY NUTRITION AT THE ROWETT RESEARCH INSTITUTE. [Aberdeen, Scotland]. *World's Poultry Sci. Jour. 10:* 9-13. 1954.—A review. Laying mashes containing 11%-12% protein high in wheat millfeeds were nearly satisfactory with summer range. Peanut meal supplement was too low in methionine but nearly adequate in Vit. B_{12} for hatchability. Viability of progeny was poor. Protein quality of whale solubles was inferior. Preservation in dilute caustic soda of herring for oil extraction damaged its protein quality. Whitefish waste ensiled with formic acid could be fed directly to all poultry. Grass juice protein precipitated by acid and heat was of inferior quality.—*J. B. Christiansen.* (Biological Abstracts)

DUNCAN, D. C., B. GREENAWAY, and REGINA FORGE.
OAT GRAIN IN LAYING RATIONS. *Agric. Gaz. N. South Wales 64:* 6,41. Illus. 1953.—At Poultry Ext. Sta., Seven Hills, 4 lots of 10 Leghorn hens each were fed, for 44 weeks, rations with all wheat, all oats, half wheat and half oats, as supplement to a dry mash of wheat meal 30 lbs., pollard 33 lbs., bran 20 lbs., meatmeal 12 lbs., peanut meal 4.5 lbs., salt 0.5 lb. Results showed, judging by the number and wt. of eggs and shell quality that oats may replace wheat; being lower in food value (63 food units per 100 for oats, 72 food units for wheat), more food is required per doz. eggs. Hence, choice of grain supplement depends on cost per food unit.—*L. G. McNeill.* (Biological Abstracts)

FISHER, H., H. M. SCOTT, and R. G. HANSEN. (Illinois Agric. Expt. Sta., Urbana.)
FURTHER STUDIES ON THE ALFALFA FACTOR AND ITS RELATION TO THE LIVER AND WHEY FACTORS. *Jour. Nutrition 52:* 13-24. 1954.—Alfalfa meal (sun-cured), defatted liver powder and dried whey were added to a purified type of chick ration in all possible combinations. The data suggest that alfalfa contains a chick growth factor that is distinct from both the liver and the whey factor. Alfalfa meal gave the greatest and most consistent response of the 3 supplements tested. The alfalfa-liver and the alfalfa-whey combinations were superior to the liver-whey combination in promoting chick growth. The observed avg. chick wts. were in good agreement with wts. calculated on the assumption that each of the 3 supplements contained separate factors. The alfalfa response could not be explained on the basis of the ash, critical amino acids or carbohydrates that it contributed to the basal diet. There was some suggestion that cellulose would account for a minor part of the alfalfa response. Growth inhibition resulting from inclusion of 40% alfalfa meal in the basal diet cannot be explained solely on the basis that alfalfa contains a toxic factor.—*Auth.* (courtesy Wistar Bibl. Serv.).

GRAU, C. R., and PHYLLIS A. ZWEIGART. (U. California, Berkeley.)
SAFFLOWER SEED MEAL. *California Agric. 7:* 8. 1953.—Safflower seed oil meal containing 40% crude protein is an economical protein source of laying hens. Preliminary feeding trails indicate that at least 15% of safflower seed oil meal can be fed in place of soybean oil meal in an all-mash ration.—*G. W. Bohn.* (Biological Abstracts)

HALBROOK, E. R., A. F. BEECKLER, and ERVIN P. SMITH. (Montana State Coll., Bozeman.)
THE VALUE OF FISH SOLUBLES AND A VITAMIN B_{12}-ANTIBIOTIC SUPPLEMENT IN CHICKEN AND TURKEY MASH MIXTURES CONTAINING TEN PER CENT MEAT SCRAPS. *Poultry Sci 32:* 1058-1068. 1953.—Condensed fish solubles either contain a new nutritional factor required by turkeys and chicks for max. growth, or 10% of meat scraps is insufficient for supplying the vit. B_{12} requirements for max. growth. The value of a vit. B_{12}-antibiotic supplement, when added to poultry mashes containing as much as 10% of meat scraps, is limited to increased growth and improved livability during the early growing period of chickens and turkeys and its chief value may be obtained in producing broilers and turkeys for market. Egg production and hatchability are not improved to any appreciable extent, if at all, from using a vit. B_{12}-antibiotic supplement in the type of basal rations used in these tests. Some evidence is presented to indicate a trend toward increased mortality during the late growing period where the use of antibiotics has improved livability during the early growing period.—*Auth. summ.* (Biological Abstracts)

HALNAN, E. T. (Agric. Sch., Cambridge U., Eng.)
PROGRES REALISES RECEMMENT EN MATIERE D'ALIMENTATION DE LA VOLAILLE. [RECENT PROGRESSES IN POULTRY FEEDING.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 80:* 383-386. 1953.—Vit. B_{12} discovery and its importance in the efficacious use with plant protein rations and grains are stressed. Use of an old litter may fill the needs of vit. B_{12} of the flock. Antibiotic use in fowl nutrition is limited though useful.—*M. Claude.* (Biological Abstracts)

HILL, F. W., and L. M. DANSKY. (Cornell U., Ithaca, N.Y.)
STUDIES OF THE ENERGY REQUIREMENTS OF CHICKENS. I. THE EFFECT OF DIETARY ENERGY LEVEL ON GROWTH AND FEED CONSUMPTION. *Poultry Sci. 33:* 112-119. 1954.—The purpose of the expts. reported was to determine the minimum level of productive (net) energy per unit wt. of diet required for max. early growth rate of chicks fed ad libitum. Productive energy levels ranging from 975 to 505 Calories per pound of diet were produced by substituting pulverized oat hulls for grain components at graded levels up to 40% of the diet. Max. growth rate was consistently obtained with 623 Calories or more per pound of diet; in several expts., max. growth rate was also produced by a diet containing 505 Calories per pound. Feed consumption increased as dietary energy concn. decreased. However, total energy intake per chick was decreased progressively as dietary energy concn. decreased. Differences in total energy consumption were reflected in carcass fat content; chicks fed the ration highest in energy concn. had the highest fat content, and fat content was progressively lower as the dietary energy level and total energy intake declined.—*F. W. Hill.* (Biological Abstracts)

HIXSON, O. F., and LAWRENCE ROSNER. (Lab. Vitamin Technol., Chicago.)
EFFECT OF UNIDENTIFIED FACTORS IN YEAST ON GROWTH AND HOCK DISORDER OF TURKEY POULTS. *Poultry Sci. 33:* 66-68. 1954.—Three brewers' yeasts, two primary grown and one torula yeast were found to stimulate the rate of growth of female turkey poults on a corn-soy type basal ration. The same yeasts also reduced the incidence of hock disorder in male turkey poults produced by incorporating 2% cod liver oil in their ration, the 3 brewer's yeasts and 1 primary grown yeast having the greatest effectiveness. Raising the niacin and vit. E content of the ration had no effect upon incidence of hock disorder.—*Lawrence Rosner.* (Biological Abstracts)

JOHNSON, ELTON L. (Iowa State Coll., Ames.)

VITAMIN B_{12} REQUIREMENTS OF HENS AS AFFECTED BY CHOLINE AND PENICILLIN. *Poultry Sci. 33:* 101-107. Illus. 1954.—Hatchability studies with New Hampshire hens over a 3-year period indicate the vit. B_{12} requirement to be at least 1, but not more than 2 μg./kg. of diet. Addition of choline or penicillin to the breeder diet did not alter the vit. B_{12} requirement for hatchability or affect progeny livability or growth. Hens were kept in cages designed especially for nutrition and hatchability studies so that natural mating could take place in wire cages with wire floors. The basal diet contained corn, soybean oil meal, minerals and vits. Chicks hatched with marginal reserves of vit. B_{12} demonstrated slow growth, but mortality was low when a vegetable diet containing 20% protein was fed during the 1st month of life. Vit. B_{12} in the dam's diet appears to be important primarily as a nutrient required for hatchability of the egg. Rapid early chick growth can be attained by vit. B_{12} supplementation of the chick diet.—*Elton Johnson.* (Biological Abstracts)

KRATZER, F. H. (U. California, Davis.)

THE RELATION OF VITAMIN B_{12} TO THE METHYLATION OF HOMOCYSTINE IN POULTS. *Jour. Biol. Chem. 203:* 367-371. 1953.—Poults from turkey hens depleted of vit. B_{12} gained wt. slowly when fed a ration with methanol extracted soybean oil meal as a source of protein and supplemented with dimethylaminoethanol and homocystine. Growth was improved by the addition of betaine or vit. B_{12}. High mortality was noted when betaine was supplied in the absence of vit. B_{12}.—*F. H. Kratzer.* (Biological Abstracts)

McDONALD, M. W.

CONDENSED WHALE SOLUBLES. AN EFFICIENT REPLACEMENT FOR MEATMEAL IN CHICKEN RATIONS. *Agric. Gaz. N. South Wales 64:* 303-304, 324-325. Illus. 1953.—In Australia, condensed whale solubles are new contributions to protein concns. for poultry feed. It is a thick, brown liquid containing approx. 50% water and 42% protein as compared with an avg. 50% protein in meat meal. Dried whale solubles are now obtained by evaporation. Two expts. to investigate the value of whale solubles as protein and vit. B complex supplement were carried out. To 200 unsexed crossbred chickens from 1-day old to 6 wks. were given 4 different rations. Rations were: (a) high B complex, 20% meat meal, no solubles; (b) high B complex, 8% meat meal, 15% solubles; (c) low B complex, 20% meat meal, no solubles; (d) low B complex, 8% meat meal, 15% solubles. The 2d expt. used 200 White Leghorns; 15% whale solubles replaced all meat meal in rations B and D. Results show that in rations with high B complex vits. provided by whey and lucerne meal, the condensed solubles gave slightly better growth than with meat meal alone. With low B complex, growth was poorer on both meat meal and solubles rations, and solubles alone gave the poorest growth. Results indicate the whale solubles to be a poor source of B complex, although satisfactory as replacement of meat meal, provided its deficiencies in Ca, P, and B vits. are considered. Directions for feeding the solubles in proper combinations with other food stuffs are given.—*L. G. McNeill.* (Biological Abstracts)

McDONALD, M., and G. L. McCLYMONT.

ANTIBIOTICS FOR GROWING PULLETS. *Agric. Gaz. N. South Wales 64:* 420-421. Illus. 1953.—The addition of antibiotics to rations for chickens during the first 12 wks. is justified, by expts. at Poultry Exp. Sta., Seven Hills, showed that while early growth of pullets was stimulated, the time of the 1st egg was not appreciably affected. To 25 day-old White Leghorn pullets, in 2 groups (250 chickens), were given 5 different rations: control with no antibiotic; procaine penicillin 4 g. per ton to 27 wks.; procaine penicillin 8 g. per ton to 12 wks.; K penicillin, 2.5 g. per ton. to 27 wks.; K penicillin, 4.5 g. per ton to 12 wks., all added to regular mash. Pullets fed antibiotics were heavier at 12 wks. than controls, but at end of the exptl. period (36 wks.) there was no difference

in feeding antibiotics past 12 wks. so far as growth was concerned. Sexual maturity and egg production were not affected. No saving of feed was made at any stage and there was no consistent response in efficiency of feed conversion. Mortality was low for all groups, and no change due to antibiotics was apparent.—*L. G. McNeill.* (Biological Abstracts)

MacGREGOR, H. I., R. M. BLAKELY, and R. W. ANDERSON. (Dominion Exptl. Sta., Swift Current, Saskatchewan, Canada.)

ANTIBIOTICS IN THE DIET OF TURKEY POULTS OF VARIOUS AGES. *Poultry Sci. 33:* 36-38. 1954.—Turkey poults which had received diets with and without procaine penicillin during the first 8 weeks were placed on diets with and without penicillin from 8 to 20 weeks of age. Addition of penicillin at 8 weeks had no effect on growth rate of those poults not receiving this supplement from 1 to 8 weeks of age. Addition of penicillin at 8 weeks to the diets of poults which had received penicillin from 1 to 8 weeks of age had no effect on the growth rate of males to 20 weeks of age, but significantly increased the growth rate of females.—*R. M. Blakely.* (Biological Abstracts)

MacINTYRE, T. M., and M. H. JENKINS. (Dominion Exptl. Farm, Nappan, N. S., Canada.)

A STUDY OF THE EFFECT OF THE FINENESS OF GRINDING GRAINS ON THE EFFICIENCY OF ALL-MASH RATIONS FOR LAYING HENS. *Canadian Jour. Agric. Sci. 34:* 10-17. 1954.—All-mash rations of 3 different degrees of granulation were fed to laying hens in pens and laying batteries. The degree of fineness of the rations was detd. by use of standard screens. The birds fed the more finely ground rations showed improved feed efficiency. Individual egg production was not significantly affected by the granulation of the ration. On being presented with a choice between coarse, medium, and finely ground rations, birds showed a preference for coarsely ground feed.—*Authors.* (Biological Abstracts)

PALAFOX, A. L., and M. M. ROSENBERG. (U. Hawaii, Honolulu.)

AN EVALUATION OF LOW-GRADE SUGAR IN STARTER AND GROWER RATIONS OF CHICKENS. *Poultry Sci. 33:* 127-133. 1954.—Replicated lots of day-old New Hampshire chicks were fed graded concns. of low-grade sugar-bagasse pith (10 to 1, by wt.) in exchange for yellow cornmeal in 2 trials that lasted 42 days. No attempt was made to balance the gross protein levels of the exptl. rations fed in trial 1. In general, chicks fed the sugar mix tended to grow at an inverse rate to its concn.; however, only the lots fed a ration containing 56.5% of this new feedstuff grew significantly slower than the control (ration 2). Growth rates that were not significantly lower than the controls' were obtained on rations containing as much as 40.0% "sugar" mix, and livability was not significantly affected even when the total ration contained 56.5%. In the 2nd expt., an attempt was made to compare rations containing different concns. of low-grade sugar-bagasse pith and yellow cornmeal in which the total protein of each ration was approx. the same. Chicks fed a ration containing 47% low-grade sugar-bagasse pith grew as well as those fed a standard starter ration. In contrast with trial 1, efficiency of the "sugar" rations increased as the concn. of the sugar mix was raised. This may have been due, however, to the increased concn. of herring meal included in these rations. Grower rations containing graded concns. of low-grade sugar and low-grade sugar-bagasse pith were also fed to cockerels when they were 8-15 weeks of age. Males grew faster than their controls when they were fed rations in which 1/3 of the yellow cornmeal (19.5% of total ration) was replaced by either low-grade sugar or sugar mix. Growth rate was not depressed when 2/3 of this cereal grain was replaced. However, growth rate was significantly depressed when all the corn meal was replaced by either product. Although efficiency of feed conversion varied inversely with the concn. of these sugar products in the exptl. rations, no mortality occurred even when all the cereal grain was replaced by either low-grade sugar or low-grade sugar-bagasse pith. Pullets fed grower rations containing graded concns. of low-grade sugar-bagasse pith responded in the same way.—*M. M. Rosenberg.* (Biological Abstracts)

REED, J. R. JR., J. H. QUISENBERRY, and J. R. COUCH. (Texas Agric. Expt. Sta., Gonzales, Texas.)

USE OF SUPPLEMENTARY METHIONINE AT LOW LEVELS IN BROILER RATIONS. *Poultry Sci. 33:* 41-47. 1954.—Experimental results in this series of tests show that the feeding of methionine at the 0.05% level produces increase in growth and improvement in feed efficiency. Best results are obtained when the amino acid is added to a ration containing fish meal or fish solubles. This indicates that there is an additive effect of the methionine when the amino acid is fed in the presence of the unidentified factor found in fish products. A significant improvement in growth was not observed when an amino acid was fed in the 3rd expt. although an improvement in feed efficiency did result. From these data it is indicated that the feeding of 0.025% methionine will produce results that are practically equivalent to those obtained by the feeding of 0.05%. It is indicated further that the level of 0.0125% methionine is not sufficient to obtain results that can be obtained by feeding 0.05% or 0.025%.—*J. R. Couch.* (Biological Abstracts)

ROMIJN, C, and W. LOKHORST.

DE INVLOED VAN JODIUM OP DE PHYSIOLOGISCHE ACTIVITEIT VAN DE KIP. [THE INFLUENCE OF IODINE ON THE PHYSIOLOGICAL ACTIVITY OF THE FOWL.] *Tijdschr. Diergeneesk. 78.* 369-392. 1953.—The I in the ration was given in excessive quantities of 10% and 3% sea weed meal and further 1% sea weed meal (Provimi) plus inorganic I (KI) equivalent to 1% sea weed meal. After 6 ms. the body wt. of the fowls fed 10% and 3% sea weed meal was about 6% lower than that of the controls; but that of the hens, fed 1% sea weed meal or KI, was about 3% higher than that of animals fed with the standard ration. Egg-production was not influenced by the higher I supply. Supplying 1% sea weed meal in the food is sufficient.—*K. Büchli.* (Biological Abstracts)

SCHAIBLE, PHILIP J. (Michigan State Coll., E. Lansing.)

GROWTH STIMULANTS IN POULTRY FEEDING. *Michigan State Coll., Agric. Expt. Sta. Quart. Bull. 36:* 257-260. 1954.—Antibiotics or arsenicals or both, at very low levels in poultry feeds prevent retardation of early growth rate of chicks or poults caused by the usual contamination found in an environment where poultry have been kept previously. These substances are not nutrients like protein, carbohydrate, etc. Adult birds do not benefit from their use. Surface active agents are claimed to act similarly, but there is little convincing evidence for their adoption at this time.—*P. J. Schaible.* (Biological Abstracts)

SHULTZ, FRED T., C. R. GRAU, and PHYLLIS ZWEIGART. (U. California, Berkeley.)

STUDIES IN PIGEON NUTRITION. *California Agric. 7:* 14, 15. Illus. 1953.—Supplemental riboflavin added to pigeon diets failed to increase numbers of eggs laid but did increase egg hatchability and squab viability. Vit. B_{12} increased hatchability. Vits. A and D were ineffective in increasing squab yields.—*G. W. Bohn.* (Biological Abstracts)

SLINGER, S. J., M. M. HAUSER, and W. F. PEPPER. (Ontario Agric. Coll., Guelph, Canada.)

THE CORRELATION BETWEEN FEED CONSUMPTION AND FECAL FLORA IN CHICKS. *Jour. Nutrition 52:* 75-88. 1954.—Groups of 18 newly hatched New Hampshire X Columbian Rock chicks were fed a practical diet, and this diet plus 15 mg. per kg. of procaine penicillin G, both on the basis of free choice and of controlled feed intake. Detns. were made daily for a 18-day period of body wt., feed consumption and fecal bacterial counts. Penicillin caused a significant increase in wt. with chicks having free access to feed but no increase when feed intake was equated. With chicks fed ad libitum, penicillin resulted in greater daily feed consumption per chick, almost without exception, for the first 28 days after hatching. On the other hand, feed consumption per unit of

body wt. was increased by the antibiotic only to about 16 days of age. These results suggest that penicillin stimulates chick growth by causing an increase in feed consumption early in the life of the bird. The real increase in feed consumption—i.e. the increase per unit of body wt.—caused by penicillin appeared to be associated with an increase in fecal coliforms or a decrease in the fecal counts of lactobacilli, anaerobes, aerobes and enterocci groups of microorganisms or both.—*Auth.* (courtesy Wistar Bibl. Serv.).

SLINGER, S. J., W. F. PEPPER, and D. C. HILL. (Ontario Agric. Coll., Guelph, Canada.)

HIGH LEVELS OF ANTIBIOTICS AND WHITE FEATHERS IN POULTS. *Poultry Sci. 33:* 211-212. 1954.—Penicillin used at the rate of 20 g./ton and Aureomycin at the rate of 50 g./ton of feed resulted in superior wt. and feed efficiency in Broad Breasted Bronze poults as compared with levels usually accepted as being adequate. This improved growth and feed efficiency with high levels of antibiotics may account for symptoms of lysine deficiency which have been observed under field conditions when a high level of antibiotic was used. Lysine deficiency symptoms were not observed in this expt. However, the lysine content of the protein was 5.7% as compared with the presently accepted requirement of 5.5%.—*S. J. Slinger.* (Biological Abstracts)

STEWART, I. J.

PENICILLIN FEEDING TRIALS WITH CHICKENS. *Jour. Dept. Agric. Victoria 51:* 407-408. 1953.—Trials carried out at the State Research Farm, Werribee for 1952, in which crystalline procaine penicillin was added to mashes fed to chickens from day-old to 14 weeks, are reported.—*R. E. Bugbee.* (Biological Abstracts)

TOMHAVE, A. E. (U. Delaware Agric. Expt. Sta., Newark.)

EFFECT OF LEVELS OF FIBER AND PROTEIN ON HATCHABILITY AND EGG PRODUCTION. *Feedstuffs 26(4):* 48-49, 52. 1954.—(From Del. Bul. 299).—New Hampshire pullets were fed the same starter and growing ration to 28 wks. The pullet wt. was 4.9 lbs. at that time. Fifty pullets were placed in each pen, and each group was fed rations calculated to contain 15.6% protein with fiber levels of 5.4 and 4.2%; other groups were fed rations containing these fiber levels plus 18.5% protein. Morning lights were used. Fiber level had less effect on egg production when the protein was raised to 18.5%. Disregarding protein, low fiber produced an avg. of 3 more eggs than higher fiber. With 15.6% protein there were 11 more eggs on lower fiber. With 18.5% protein there were 11 eggs per hen more on 5.4% fiber, but 8 eggs less per hen on the 4.2% fiber; disregarding fiber, there was an increase of 3 eggs per bird with the higher level of protein. Higher protein level was more effective in increasing egg production in the cool mos. On 18.5% protein, fiber level did not influence feed efficiency, but on 15.6% protein the lower fiber level was more efficient. Birds on the lower level of protein gained more wt. Less feather picking occurred on higher protein, and also wetter litter.—*H. L. Wilcke.* (Biological Abstracts)

WHITE-STEVENS, R. (Lederle Lab., Pearl River, N.Y.)

ANTIBIOTICS IN COMMERCIAL GROWING. *Amer. Egg and Poultry Rev. 15:* 18, 20-23. 1953.—A review of the use of antibiotics in poultry feeds with 4 tables giving results obtained when aureomycin was fed at different levels where chronic respiratory disease (C.R.D.) was present. In poultry, high levels of antibiotics (50-100 g./ton) have proved effective in sustaining growth efficiency and economic returns in the face of serious endemic infections (air sac disease, C.R.D., blue comb, enteritis) of both growing and laying chickens and turkeys.—*H. G. Lindquist.* (Biological Abstracts)

PATHOLOGY

BURMESTER, B.R. , and R. F. GENTRY. (U.S. Reg. Poultry Lab., East Lansing, Mich.)
THE TRANSMISSION OF AVIAN VISCERAL LYMPHOMATOSIS BY CONTACT. *Cancer Res. 14:* 34-42. 1954.—Data were collected on the incidence of neural and visceral lymphomatosis and of osteopetrosis in a total of 1226 chickens inoculated with filtrable agent of visceral lymphomatosis, 508 chickens in direct contact with siblings inoculated, and 687 isolated chickens. The incidence of visceral lymphomatosis among inoculated groups varied from 33.8 to 95.0% and of osteopetrosis from 0 to 60%. In the various contact groups visceral lymphomatosis varied from 5.4 to 71.5%. Osteopetrosis did not occur in any contact or isolated groups and neural lymphomatosis was present to the extent of less than 3% in any major group. Of the 4 strains of lymphomatosis (RPL 12, 16, 18, and 20) only strain 12 gave significant contact transmission and even with this strain it did not occur in all inoculations. The reasons for such variations were not detd. High rates of contact transmission that occurred under exptl. conditions were reduced to insignificant levels by confining inoculated lots to separate cubicles having solid walls but an open top. Cubicle isolation to 60 days of age did not prevent all contact transmission; whereas, cubicle isolation to 90 days resulted in no apparent contact transmission. The extent of contact transmission was found to have a direct linear relation to the exposure dosage when in terms of the logarithm of the percentage of the population inoculated. Transmission results indicate that the causative agent of visceral lymphomatosis is different from that causing osteopetrosis and that causing neural lymphomatosis.—*B. R. Burmester.* (Biological Abstracts)

EVELETH, D. F., and ALICE I. GOLDSBY. (N. Dakota Expt. Sta., Fargo.)
TOXICOSIS OF CHICKENS CAUSED BY TRICHLOROETHYLENE-EXTRACTED SOYBEAN MEAL. *Jour. Amer. Vet. Med. Assoc. 123:* 38-39. 1953.—Soybean oil meal that is highly toxic to cattle may at times be toxic to chicks as shown by higher death loss, growth failure, and decreased resistance to disease.—*Auth. summ.* (Biological Abstracts)

HARRISON, A. P. JR., P. A. HANSEN, H. M. DeVOLT, ANITA P. HOLST, and F. G. TROMBA. (U. Maryland, College Park.)
STUDIES ON THE PATHOGENESIS OF INFECTIOUS ENTEROHEPATITIS (BLACKHEAD) OF TURKEYS. *Poultry Sci. 33:* 84-93. Illus. 1954.—In expts. designed to show the incidence and influence of sometimes associated bacteria in liver lesions, bacteria were found to be associated with the causative protozoan agent, *Histomonas meleagridis*, in 29 (48.3%) out of a total of 60 blackhead livers examined over a 3-yr. period. *H. meleagridis* often could be found in liver lesions in a bacteria-free state by sacrificing young turkeys early in the course of the disease. Of the total no. of 15 associated bacterial species isolated, *Escherichia coli* was most frequently encountered. Bacterial organisms pathogenic per se constituted a minority group among associated strains. Typical blackhead lesions could be reproduced in bacteria-free state by intrahepatic inoculations with bacteria-free suspensions of the causative parasite, *H. meleagridis*, in liver-lesions tissue. It is therefore concluded that sometimes associated bacteria are not essential to development of liver lesions in infectious enterohepatitis of turkeys.—*Auth. summ.* (Biological Abstracts)

RIEDEL, BERNARD B. (Mississippi Expt. Sta., State College.)
TRYPTOPHANE AND ITS RELATIONSHIP TO ASCARID INFECTIONS IN NEW HAMPSHIRE CHICKS. *Poultry Sci. 33:* 80-84. 1954.—New Hampshire chicks were fed high and low tryptophane diets. After feeding the diets for 17 days, the chicks were individually infected with about 600 embryonated *Ascaridia galli* ova. Three weeks after infection, the birds were autopsied and the parasites harbored were collected, counted, and measured. These data and the host wt. records served as the criteria of this investigation. The wt. records of the

chicks whose diet contained 0.28% of tryptophane were significantly greater than those of the chicks whose diet contained only 0.122% of tryptophane. A comparison of the wt. records of the exptl. groups of birds with the wt. records of the noninfected control birds failed to show that the hosts which received adequate tryptophane to promote growth also possess greater resistance. The numbers and lengths of the *Ascaridia galli* harbored by the chickens indicated that adequate tryptophane to promote growth did not influence higher resistance.—*B. B. Riedel.* (Bioi logical Abstracts)

WILSON, J. E. (Min. Agric. and Fish. Lasswade, Midlothian, Scotland.)
POULTRY DISEASES IN SCOTLAND—A SURVEY. *World's Poultry Sci. Jour. 10:* 27-32. 1954.—Leukosis, the chronic type of fowl cholera, colds responding to sulfonamides, round heart disease (particularly on built-up litter), coccidiosis and *S. pullorum, S. typhimurium,* and *S. thompson* infections are common in poultry. Infectious sinusitus in turkeys responds to local penicillin and streptomycin injns. Laryngotracheitis and aspergillosis are found occasionally. Blackhead in turkeys is well controlled now; however, hexamitiasis is not. Fowl typhoid and chronic respiratory disease are rare, while Newcastle disease and infectious bronchitis are absent.—*J. B. Christiansen.* (Biological Abstracts)

MANAGEMENT

CLANDININ, D. R., and A. R. ROBBLEE. (U. Alberta, Edmonton.)
RADIANT HEATING. 2. OPTIMUM FLOOR TEMPERATURES FOR BROODING CHICKS. *Poultry Sci. 33:* 69-70. 1954.—In experiments designed to yield data on optimum floor temps. for radiant brooding of chicks, no differences were noted in levels of mortality or rates of growth to 26 days of age of chicks started at 95°, 90°, 85°F. in radiant floor-heated pens.—*D. R. Clandinin.* (Biological Abstracts)

DOBIE, JOHN B., and LEROY C. KLEIST. (U. California, Davis.)
HEATING POULTRY DRINKING WATER. *California Agric. 8:* 7. Illus. 1954.—Tests of 3 methods of electrically heating poultry watering systems indicated that it was most economical to run the heating cable through the water pipe.—*G. W. Bohn.* (Biological Abstracts)

GETTY, J. (N. Scotland Agric. Coll., Aberdeen.)
INTENSIVE POULTRY KEEPING. *Scottish Agric. 33:* 58-61. 1953.—A description is given of 3 intensive systems of poultry production. Equipment, organization and comparative advantages or disadvantages of the deep litter, hen yard and laying batteries systems are discussed.—*C. E. Foister.* (Biological Abstracts)

HOFF, P. R. (Cornell U., Ithaca, N.Y.)
WHAT ABOUT POLE-TYPE HOUSES? *Poultry Tribune 60:* 8, 31, 36-37. 1953.—An example, including general floor plan, of a 46 ft. x 96 ft. pole-type chicken house. This is a cheaply constructed house with a dirt floor.—*F. P. Jeffrey.* (Biological Abstracts)

KENNARD, D. C. (Ohio Agric. Expt. Sta. Wooster, Ohio.)
COMPOST (BUILT-UP) LITTER AS A SANITATION PROCEDURE. *World's Poultry Sci. Jour. 10:* 40-44. 1954.—Repeatedly re-used built-up litter destroyed *S. pullorum* and *S. gallinarium* contamination in less than 20 days, while the organisms persisted in new litter for more than 60 days. Two of the tests followed the disappearance of organisms from the litter of unpopulated pens, while another followed the disappearance in the presence of originally uninfected chicks. The 3 tests gave similar results.—*J. B. Christiansen.* (Biological Abstracts)

KOSIN, I. L. (State Coll., Washington, Pullman.)
LENGTH OF PRE-INCUBATION STORAGE AND HEREDITY AS FACTORS AFFECTING THE HATCHABILITY OF TURKEY EGGS. *Poultry Sci. 33:* 24-28. 1954.—This study was based on the Broad Breasted Bronze and Beltsville Small White eggs. Bulk of the eggs came

from the Station flocks. All eggs were stored, before setting, for 1-14 days at 55°F. and 45% relative humidity. It was found that setting eggs before they were 7 days old proved to be of no advantage from the standpoint of hatchability of fertile eggs. A reasonably consistent break was found to occur after 7 days of storage. The data suggested that breeding for improved hatchability of fertile eggs should also lead to an improved ability of eggs to endure longer pre-incubation storage.—*I. L. Kosin.* (Biological Abstracts)

KRUEGER, W. C. (Rutgers U., New Brunswick, N.J.)

SOLAR BROILER HOUSE. *Poultry Tribune 59:* 9, 31. 1952.—A brief description, including floor plan, or a 48 ft. x 234 ft. solar brooder house developed by the Better Farm Buildings Association.—*F. P. Jeffrey.* (Biological Abstracts)

KRUEGER, W. C. (Rutgers U., New Brunswick, N.J.)

SOLAR LAYING HOUSE. *Poultry Tribune 60:* 12, 48-49. 1953.—A brief description, including floor plan, of a 30 ft. x 108 ft. solar laying house developed by the Better Farm Buildings Association.—*F. P. Jeffrey.* (Biological Abstracts)

KRUEGER, W. C. (Rutgers U., New Brunswick, N.J.)

GABLE ROOF HOUSE FOR LAYERS. *Poultry Tribune 60:* 12, 48-49. 1953.—Plans given for a 42 ft. x 120 ft. gable roof laying house. This plan was developed by Rutgers Univ. and houses built from this plan are being used by commercial poultrymen.—*F. P. Jeffrey.* (Biological Abstracts)

MITCHELL, M. S., and I. L. KOSIN. (State Coll. Washington, Pullman.)

THE EFFECTS OF CONTROLLED AMBIENT TEMPERATURE ON SOME FACTORS ASSOCIATED WITH EGG LAYING IN TURKEYS. *Poultry Sci. 33:* 186-191. 1954.—Six weeks prior to the beginning of the 1951 breeding season, 32 Broad Breasted Bronze males were selected at random. These were divided equally between an insulated pen maintained at 65°F. ± 5° and an outdoor pen. The males were given 13 hours of light per day. 99 Broad Breasted Bronze females were selected at random and divided into 2 groups, one placed in an insulated house maintained at 65°F. ± 5°, the other in a turkey breeder house with no means of temp. control. Each group was subdivided, making possible 4 different treatment matings: males from the heated environment to both the female environments, and males from the outdoor pen to both female environments. All matings were natural. A minimum of 13 hours of light per day was maintained in the hen pens at all times. Egg collections extended over eight 28-day periods. All eggs were individually pedigreed. Observations included: Time of day egg was laid, broodines, egg wt. and specific gravity of the eggs. Results indicate the following: a temp. controlled environment at 65°F ± 5° had a greater tendency to induce broodiness than an environment of normal daily temp. fluctuations; rate of production was significantly higher in the uncontrolled environment; a temp. regulated at 65°F. ± 5° significantly lowered egg wt.; temp. had no effect on the "specific gravity" of the eggs.—*I. L. Kosin.* (Biological Abstracts)

ANONYMOUS.

HIGH-ALTITUDE RESEARCH STUDIES. EFFECTS OF PANTING ON EGG SHELL QUALITY AND TURKEY GROWTH RATE DESCRIBED. *Amer. Egg and Poultry Rev. 15:* 22. 1953.—Preliminary work done, under the direction of the College of Agriculture (Davis, Cal.) at the University's White Mountain High-Altitude Research Station near the Nevada line, indicates that panting (lowered CO_2 in the blood) is a minor factor in egg shell thinning in hot weather. Turkey poults reared to maturity on White Mountain (elevation 11,000 feet) outgrew those reared at Davis.—*H. G. Lindquist.* Biological Abstracts)

GENERAL

REID, W. M., and AHMED DARDIRI. (Cairo U., Egypt.)
THE NATIVE EGYPTIAN HATCHERY IN A POULTRY IMPROVEMENT PROGRAM. *World's Poultry Sci. Jour. 9:* 206-213. 1953. —The mud-brick, kiln type hatchery, thousands of years old, heated by a smouldering fire and with a normal 6,000-egg capacity in each of the 6 units, still hatches 99% of the Egyptian chicks. The former 200 million egg annual export trade was destroyed primarily by Newcastle disease. Problems of small egg size, mongrel breeding, and disease control require the aid of these hatchery operators.—*J. B. Christiansen.* (Biological Abstracts)

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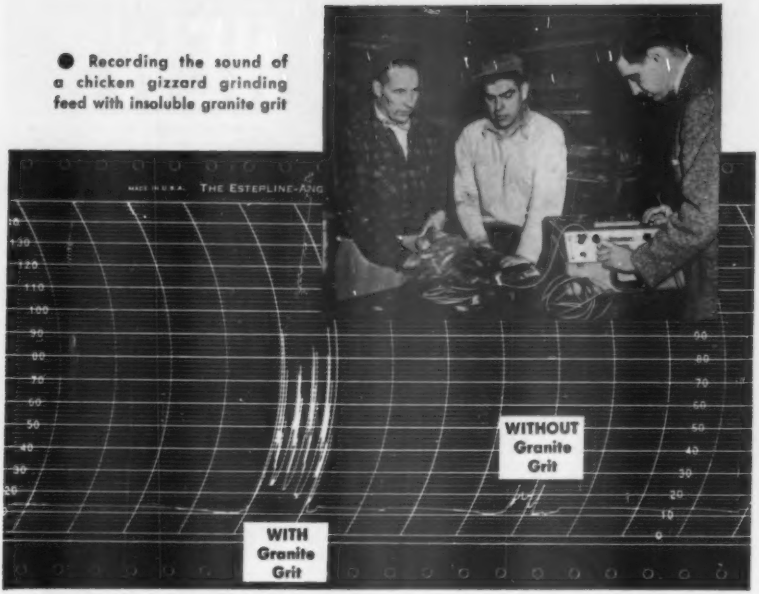

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U.S.I. Vitamin B_{12} Supplement is a product of a primary bacterial fermentation designed solely for the production of Vitamin B_{12}. Vitamin B_{12} enables birds to make use of available protein and thus increase egg and meat production.

U.S.I.'s Antibiotic and Vitamin B_{12} Supplements are supplied separately or in combination to meet individual formulation requirements.

U.S.I. PERMADRY FORTIFIES RATIONS WITH "SEALED-IN" VITAMIN A

Chickens need vitamin A for high egg production, good weight gain and feed efficiency, low mortality rate and for general good health. U.S.I. PERMADRY vitamin A spheroids offer feed manufacturers a tested and superior means of vitamin A fortification. This sealed-in form of vitamin A is manufactured under U. S. Patent 2,496,634 and has been shown in experiment station tests to be far more biologically available to poultry than vitamin A from fish oil sources.

B COMPLEX VITAMINS AID GROWTH OF BIRDS

The addition of B complex vitamins to poultry feed increases growth rate and helps produce more uniform, full-fleshed birds — also aids in protein and carbohydrate utilization. U.S.I. supplies riboflavin, calcium pantothenate (dextrorotatory), niacin U.S.P., and choline chloride. Choline chloride is available in 25% dry mix or 70% aqueous solution.

DL-METHIONINE FOR HIGH ENERGY RATIONS

U.S.I. is the pioneer producer of methionine, the low-cost, essential amino acid. Rations that are supplemented with DL-Methionine produce increased return over feed costs and a more rapid growth rate. Methionine is also effective in improving feathering. Your best supply — from U.S.I.

U.S.I. Feed News A Regular Feature

Each month U.S.I. publishes a full page FEED NEWS in the leading publications reaching nutritional and feed formulation specialists. Informative items of interest to all who use feeds and feed supplements are included. Follow this series in U.S. feed publications for new developments in the poultry feeding industry, or send us your name, address and title on your company letterhead to be placed on our mailing list.

FEED PRODUCTS OF U.S.I.

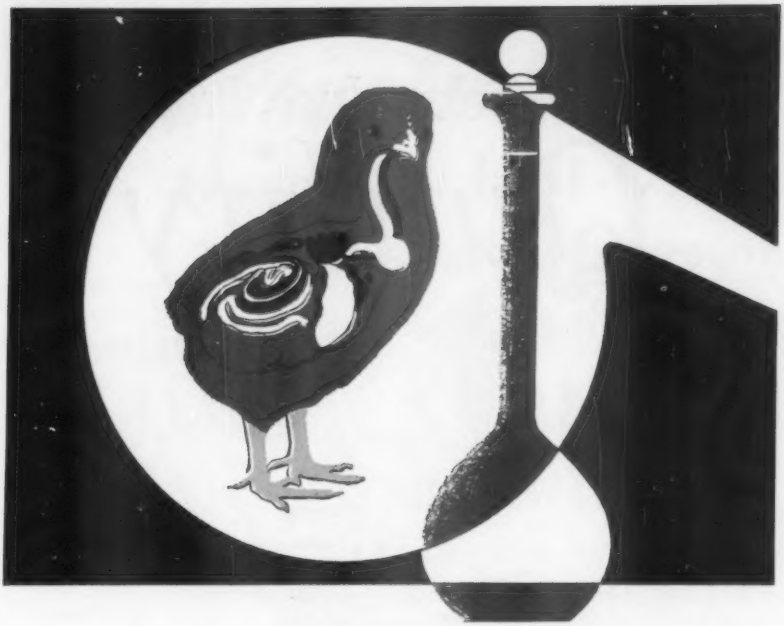
- CURBAY* B-G 80, dried molasses fermentation solubles
- U.S.I. VITAMIN B_{12} AND ANTIBIOTIC FEED SUPPLEMENTS
- U.S.I. CHOLINE CHLORIDE (25% dry or 70% solution)
- U.S.I. MENADIONE MIXES (vitamin K_3)
- U.S.I. RIBOFLAVIN Products
- U.S.I. NIACIN
- U.S.I. CALCIUM PANTOTHENATE Products
- U.S.I. DL-METHIONINE (feed grade)
- U.S.I. VITAMIN A & D Products (stabilized)

*Reg. U. S. Pat. Off.

BRANCHES IN ALL PRINCIPAL CITIES

U.S.I. INDUSTRIAL CHEMICALS CO.

Division of National Distillers Products Corporation



continuous research *at Dr. Salsbury's Laboratories has resulted in many new developments for the poultry industry*

DR. SALSBURY'S WAVAC—the new drinking water vaccine for Newcastle disease — is Dr. Salsbury's latest contribution to the poultry industry. WAVAC takes the work out of vaccinating. Proven safe, effective in tests on thousands of chickens.

DR. SALSBURY'S Infectious Bronchitis Vaccine—is another Dr. Salsbury FIRST. This live-virus, attenuated intranasal vaccine is saving the poultry industry millions of dollars by effectively preventing Infectious Bronchitis.

DR. SALSBURY'S Wormal—is helping poultry raisers worm their chickens with greater effectiveness. Wormal Granules expel all types of tapeworms, large roundworms and cecal worms. Wormal Tablets also expel intestinal capillarids. Wormal contains the new tapeworm drug—Butynorate.

Dr. Salsbury's Laboratories accepts the responsibility of leadership in developing new and improved products for the poultry industry through continuous scientific research. Your inquiries regarding the above products or any poultry disease problems will be promptly answered.

a complete line of poultry medicines

Dr. SALSBURY'S

Dr. Salsbury's Laboratories
Charles City, Iowa

the hens, themselves, built

Quality

into

Ful-O-Pep

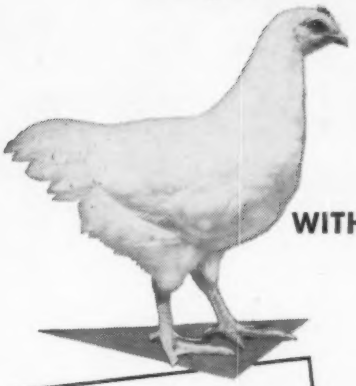
30 years of progressive research keeps Ful-O-Pep's nutritional standards high

Yes, men of science take off their hats to the hens, in building Ful-O-Pep quality! In testing new ingredients and feeding plans, research experts go to the hens, themselves, with their questions.

And for these questions they get 2,200 answers each year! That's the number of laying hens maintained at the Ful-O-Pep Farm . . . the oldest continuously operated research farm ever established by a commercial concern. Here, in 30 progressive years, Ful-O-Pep Feeds have been constantly improved. Egg production has doubled. Mortality has been cut more than half. New feeding plans have been formulated . . . offering the poultryman greater economy and higher production.

Practical Ful-O-Pep Research is concerned with helping the farmer to keep his cash income well ahead of his operating costs. Only quality results can do this! And so quality is the watchword, at the Libertyville, Illinois, proving ground . . . where hens have the last word.

Give your birds "teeth" to grind their feed!



Get faster growth
Cut feeding costs
WITH STONEMO GRANITE GRIT

Your birds need "teeth" to help them make better use of their feed... grow faster... reduce your feeding costs! Give them insoluble STONEMO Granite Grit.

HELPS SPEED GROWTH—STONEMO's extra grinding surfaces help grind feed extra fine in the gizzard...crush grains and grasses ...grind open many cellulose "capsules" in feed. This releases *more body-building nutrients* for faster growth and development.

HELPS SAVE FEED DOLLARS—STONEMO helps make your feed work harder...helps produce big, sturdy birds at less cost. You save money—step up profits!

GET STONEMO TODAY!—Put real "teeth" in your feeding program now. Get STONEMO Granite Grit in handy 10-lb. HOPPER-PAKS, or 25, 50 or 80-lb. economy bags. The easy-to-use HOPPER-PAK has trays to pull out to make a convenient hopper. It saves work—saves time! See your hatchery, feed or poultry supply dealer *today*.

FOLLOW THESE 3 STEPS TO GROW BIG, STURDY BIRDS!

FINE SIZE STONEMO
First 2 days—Feed fine chick grains and fine-size STONEMO. Mix 10 lbs. grain to 1 lb. grit.
3 days to 4 weeks—Start feeding mash...give fine-size STONEMO in HOPPER-PAK, or hoppers.

MEDIUM SIZE STONEMO
4 weeks to 8-10 weeks—Gradually switch to medium-size STONEMO—then keep hoppers full.

COARSE SIZE STONEMO
8-10 weeks on—Switch to coarse-size STONEMO. Then keep it before birds at all times...during growing period and in laying house.

STONE MOUNTAIN GRIT COMPANY, INC.
Executive Offices and Quarry: LITHONIA, GA.
Branch Quarry: BARRE, VERMONT

PRODUCTS *of* SCIENTIFIC MERIT . . .

a guiding principle for 24 years

Twenty-four years ago Whitmoyer Laboratories was founded on the policy of formulating "Products of Scientific Merit." That is still our guiding principle today.

Through a constantly expanding program of sound, scientific research, we have striven to assist the poultry and feed industry in solving many disease and nutritional problems. Among several significant developments, in which we were commercial pioneers, are the following:

- Marketing cod liver oil with the vitamin A and D unit potency standardized and guaranteed—WHIT-COD.
- Producing a stabilized "protein-bound" iodine—in combination with other important trace minerals—TRA-MIN.
- Using sulfa compounds for treating certain poultry diseases —SULFATROL.
- Manufacturing a safe, dependable poultry delouser containing Benzene Hexachloride—Whitmoyer BHC ROOST PAINT.
- Formulating worm treatments which effectively remove the common species of tapeworms, as well as large round worms and cecal worms—VERMEX POWDER and VERMEX TABLETS.
- Recognizing the value of antibiotics in treating certain specific disease conditions in poultry.

You can depend on our highly-trained research staff to make certain Whitmoyer Products are scientifically sound . . . economically practicable.

We welcome your inquiries for data on Whitmoyer Products . . . or for consultation with our staff members on disease or nutritional matters.

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THE SAFEST, MOST EFFECTIVE AGENT for Preventing Coccidiosis Outbreaks!

SULFAQUINOXALINE

There are many species of coccidia that attack the gut in different places. SULFAQUINOXALINE is the *only* agent that combats *all* dangerous types of poultry coccidia.

To make profits, poultrymen must keep costs down and quality up. Prevention of coccidiosis outbreaks with a *reliable* coccidiostat may spell the difference between profit and loss.

Experience with hundreds of millions of birds has proved SULFAQUINOXALINE the *safest* and *most effective* over-all coccidiostat available. Fed continuously at preventive levels, SQ has reduced mortality to *less than 2 per cent* and also has drastically reduced stunting due to coccidiosis. These benefits sharply lower production costs and improve quality. Exposed birds protected with SULFAQUINOXALINE also use feed more efficiently, and weigh more at market time.

SULFAQUINOXALINE has been proved scientifically and commercially. It is the coccidiostat backed by the most extensive research. You can recommend SQ confidently to every poultryman.

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